

In the Supreme Court

**OF THE
United States**

OCTOBER TERM, 197

Supreme Court, U. S.

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No. _____

76-1425

**MAURICE A. GARBELL, INC.,
and
GARBELL RESEARCH FOUNDATION**

Petitioners,

v.

THE BOEING COMPANY,

Respondent.

AND

**MAURICE A. GARBELL, INC.,
and
GARBELL RESEARCH FOUNDATION**

Petitioners,

v.

McDONNELL-DOUGLAS CORPORATION,

Respondent.

**PETITION FOR WRIT OF CERTIORARI
to the United States Court of Appeals
for the Ninth Circuit**

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San Francisco, Calif. 94103
Counsel for Petitioners**

March 22, 1977.

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STATUTORY PROVISIONS ON PATENTABILITY
OF INVENTIONS AND GRANT OF PATENTS.
35 U.S.C.A.

35 U.S.C. 102. Conditions for patentability;
novelty and loss of right to patent

A person shall be entitled to a patent unless

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for patent, or

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of the application for patent in the United States, or

.

(g) before the applicant's invention thereof the invention was made in this country by another who had not abandoned, suppressed, or concealed it. In determining priority of invention there shall be considered not only the respective date of conception and reduction to practice of the invention, but also the reasonable diligence of one who was first to conceive and last to reduce to practice, from a time prior to conception by the other. July 19, 1951, c. 950, par. 1, 66 Stat. 797.

35 U.S.C. 103. Conditions for patentability;
non-obvious subject matter

A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made. July 19, 1952, c.950, sec. 1, 66 Stat. 798.

35 U.S.C. 112. Specification

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same, and shall set forth the best mode contemplated by the inventor of carrying out his invention.

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

35 U.S.C. 282. Presumption of validity; defenses

A patent shall be presumed valid. The burden of establishing invalidity shall rest on a party asserting it.

. . . July 19, 1952, c. 950, sec. 1, 66 Stat. 812.

35. U.S.C. 285. Attorney fees

The court in exceptional cases may award reasonable attorney fees to the prevailing party. July 19, 1952, c. 950, sec. 1, 66 Stat. 813.

**TO THE HONORABLE WARREN E. BURGER,
CHIEF JUSTICE OF THE UNITED STATES, AND TO
THE HONORABLE ASSOCIATE JUSTICES OF THE
SUPREME COURT OF THE UNITED STATES:**

Maurice A. Garbell, Inc., a corporation, and Garbell Research Foundation, a corporation, petitioners, respectfully pray that a writ of certiorari issue to review the opinion and decision of the United States Court of Appeals for the Ninth Circuit entered in the above-entitled cases on November 10, 1976; a Petition for Rehearing was denied by the Circuit Court of Appeals on December 28, 1976.

OPINIONS BELOW.

The preliminary findings and memorandum decision of the District Court are reported at 385 F.Supp. 1. A copy thereof appears in Appendix A. The opinion and decision of the Court of Appeals is reported at 546 F.2d 297, and a copy of it appears in Appendix B. The Order of the Court of Appeals, denying the Petition for Rehearing appears in Appendix C.

JURISDICTION.

The Decision of the U. S. Court of Appeals for the Ninth Circuit was entered on November 10, 1976, and the Order denying the Petition for Rehearing was entered December 28, 1976. The jurisdiction of the District Court was based on 35 U.S.C. 271, 281, and 28 U.S.C. 1338. The jurisdiction of the Court of Appeals was based on 28 U.S.C. 1282.

This Petition for a Writ of Certiorari is filed less than 90 days from the date of said Order. The jurisdiction of this Honorable Court is invoked under 28 U.S.C. 1254(1).

QUESTIONS PRESENTED FOR REVIEW.

The District Court sustained all of the defenses against the validity of U.S. Patent No. 2,441,758, a patent on a novel airplane-wing shape, and ruled the cases "exceptional" for the purpose of awarding attorneys' fees in the amount of \$237,062.50 and costs in the amount of \$51,943.03 against plaintiffs. The Court of Appeals for the Ninth Circuit affirmed the district-court judgment "in all respects."

The questions presented below call for the exercise of this Honorable Court's power of supervision and review, for the reason that the rules and standards affirmed by the Court of Appeals in the instant cases are in conflict with the rules and standards uniformly applied in infringement actions by a majority of the circuits in the United States, and by this Honorable Court and the Court of Claims, involving important questions of general significance that should be resolved by this Court.

The questions presented are:

I. Whether a patent holder is to be punished by orders to pay \$237,062.50 in attorneys' fees and \$51,943.03 in costs on the flimsiest of grounds, and in total disregard of the rule requiring "clear, unequivocal and convincing evidence" of "willful acts" of misconduct.

II. Whether said punitive money judgment and the invalidation of the patent are to be made on rulings that are in conflict with the requirement for "clear and convincing evidence" to overcome the strong presumption of validity of a patent under the Statute.

I. QUESTIONS ON "CLEAR, UNEQUIVOCAL AND CONVINCING EVIDENCE" REQUIRED TO ESTABLISH A CASE AS "EXCEPTIONAL."

I-1. Whether a holding of "bad faith" by the inventor and patentee, and a holding that the conduct of the inventor and patentee "was below the standards of good faith and candor required by inventors dealing with the Patent Office," satisfies the standard uniformly applied in infringement actions by the majority of circuits in the

absence of a finding by the District Court of any "willful act" on the part of the inventor and patentee on which such findings and conclusions of law of "bad faith" or "lack of candor" could be predicated.

I-2. Whether a lawsuit is "brought improvidently," when it is brought on the advice of attorneys on a patent that had been held valid and infringed in a previous suit in another District Court in the same District, and after the plaintiffs have proved infringement in the instant action.

I-3. Whether a holding of "intransigence and vexatious behavior by the plaintiffs which ran up costs" which holding relies on "circumstantial evidence" that is not specified, satisfies the standard uniformly applied in infringement actions by the majority of circuits, that misconduct under either theory must be established by "clear, unequivocal and convincing" evidence if a case is to be held to be "exceptional" for the purpose of awarding attorneys' fees, as is summarized, for example, in Pfizer, Inc. v. International Rectifier Corp., 538 F.2d 180 (8th Cir. 1976). (35 U.S.C. 285).

II. QUESTIONS ON THE "CLEAR AND CONVINCING PROOF" TEST REQUIRED TO OVERCOME THE STRONG PRESUMPTION OF THE VALIDITY OF A PATENT UNDER 35 U.S.C. 282.

Whether summary affirmation by the Court of Appeals for the Ninth Circuit of the Findings of Fact and Conclusions of Law of the District Court "in all respects," sustaining all defenses against the validity of the patent, is not in conflict with the general and fundamental rule that, in order to overcome the strong presumption of validity of a patent, the "clear-and-convincing-proof" test must be applied to each defense as required by decisions of this Honorable Court and the Courts of Appeals of other circuits. (35 U.S.C. 282).

In the instant cases, this basic question arises as to each of at least the following defenses:

II-1. Whether the delivery of a single 3/40th-scale miniature static wind-tunnel model, sold exclusively for experimental wind-tunnel testing, constitutes a "clear and convincing proof" of "on sale" of an airplane and its wing under the rules exemplified in Ushakoff v. United States (Ct.Cl.1964) 327 F.2d 669, at 677. (35 U.S.C. 102(a)).

II-2. Whether, after the adoption by the District Court of the Findings of the Special Master, in which the Special Master made a Finding as to the one and only anticipation of the patent in suit by the so-called "Curtiss-Wright Development," namely, that:

"It is true that the evidence is less than one would desire to determine definitively and free from doubt what shape the CW-23 airfoil probably took." (Emphasis added),

the correct conclusion of law could be anything other than that the defendants' proof failed to satisfy the "clear-and-convincing-proof" test required for an invalidating anticipation. (35 U.S.C. 102(g)).

II-3. Whether the evaluation, under oath, by the designer of the Defendants Douglas' accused DC-8 wing as "revolutionary," which DC-8 wing was found by the Special Master to have the same airfoil shape as the wing of the patent claims in suit, thereby accomplishing "revolutionary" operational and safety advantages, should be a factor in the proof of unobviousness. United States v. Adams, 383 U.S. 39, 86 S.Ct. 708, 713, 15 L.Ed. 572 (1966). (35 U.S.C. 103).

II-4. Whether the Findings of "inoperativeness" and "indefiniteness" satisfy the "clear-and-convincing-proof" requirement under 35 U.S.C. 282 in the face of a prior decision of another District Court (94 F.Supp. 843), reversed on the ground of shopright (204 F.2d 946), that the patent was valid and that hundreds of commercially operating Consolidated-Vultee "Convair-240" airliners constituted infringement of the patent in suit, and in the

face of the Special Master's Finding, adopted by the present District Court here, that Defendant Douglas' accused DC-8 airliners have the same airfoil shape as that of the patent in suit, and where the record contains prima-facie proof of infringement by successfully "operating" DC-8 airliners. Freedman v. Overseas Scientific Corp., (C.A. N.Y. 1957) 248 F.2d 274, at (276. (35 U.S.C. 112)).

II-5. Whether the submittal of a sole original manuscript to the Editorial Board of a professional society journal for consideration of possible later publication therein should constitute "printed publication" contrary to all existing rules of law. Application of Tenney, 254 F.2d 619, at 621. (35 U.S.C. 102(a)).

II-6. Whether the rule requiring "clear and convincing proof" is satisfied by the prior publications and knowledge which "contained no other wing description (that) exactly duplicates the Garbell wing", and whether, in addition, the presumption of validity is further strengthened by the admission of Defendants' expert Abbott that the Cronstedt patent, which was considered and cited by the Patent Examiner in the patent in suit, was closer than any of said prior publication and knowledge. Universal Athletic Sales Co. v. American Gym, etc., supra (35 U.S.C. 282).

II-7. Whether it was incumbent on the Court of Appeals, in the light of the "clear-and-convincing-proof" requirement of the United States Code, to examine the record and ascertain that there is absolutely no evidence of any kind in the record that would support the defenses of an exchange of classified data, a distribution of any report by Consolidated-Vultee, any "offer of sale" to a Captain Diehl of the U.S. Navy, any "sale" to the U.S. Air Force, or any unclassified disclosure to anyone that could invalidate the patent in suit.

STATEMENT OF THE CASE.

This is a suit for infringement of United States Patent No. 2,441,758, granted to Maurice A. Garbell, which patent was assigned to Plaintiffs. The patent is entitled "Fluid Foil Lifting Surface" (Appendix D); the patent covers a novel airplane-wing shape that achieves a novel and safe wing-stall ("loss-of-lift") characteristic in conditions of high wing lift. Prior wings had stalled at the tip or at the root; they had pitched up and rolled over into an ultimate crash when a high angle of attack had been exceeded inadvertently. The wing of the Garbell patent generates a broad inboard-panel stall and restores its lifting capability by a gentle, safe, pitch-down, free from excessive roll. Throughout the trial, the invention was frequently referred to as the "Garbell Wing," which term shall be used in this Petition for Writ of Certiorari.

The patent was issued on May 18, 1948, on an application filed on July 16, 1946. The Plaintiffs filed an infringement suit, in 1948, against Consolidated-Vultee Aircraft Corporation (later succeeded by General Dynamics Corporation) in another District Court in the same District. In that action (94 F.Supp. 843, S.D. Cal. 1950) the patent was held valid and infringed, but, on appeal from that judgment, the Court of Appeals for the Ninth Circuit held that Consolidated-Vultee had a shopright under the patent (204 F.2d 948, 9th Cir. 1953).

The first Complaint in the present Boeing and McDonnell-Douglas cases, which cases were subsequently consolidated, was filed on June 6, 1963. The patent expired during these litigations on May 18, 1965.

After some discovery proceedings, the trial court granted Defendants' motion, over Plaintiffs' objections, that the case be referred to a Special Master. One of the grounds of Plaintiffs' opposition was that the limited funds of the Plaintiffs could not provide for the inevitable very heavy expenses of such reference.

Numerous depositions were taken, and Defendants had the Special Master accompany Defendants' counsel to the East Coast and other distant locations, at Defendants' expense, to be in attendance at several of the depositions.

Thereafter, in 1970, evidentiary hearings on the geometric shape of various airfoils and wings were held before the Special Master for a period of 30 hearing days (seven elapsed weeks). Thereupon the Special Master issued Findings which in almost all respects were favorable to the validity of the patent. The only material issue on which the Special Master made a finding unfavorable to Plaintiffs was on alleged prior art by a "Curtiss-Wright Development" related to the Curtiss-Wright Model 23 and 21-B airplanes. As to the shape which the Special Master believed the critical "CW-23 airfoil probably took," the Special Master conceded that:

"It is true that the evidence is less than one would desire to determine definitively and free from doubt what shape the CW-23 airfoil probably took."

The Special Master found that none of the prior publications presented to him for Findings suggested a Garbell wing.

The Special Master made a finding as to the shape of the DC-8 wing of Defendant McDonnell-Douglas, and that shape is the same as that of the Garbell wing of the patent in suit.

After the hearing before the Special Master, the trial judge adopted the Findings of the Special Master. The case was set for trial. The court ordered the trial to be limited to the issue of the validity of the patent in suit, and the trial was held accordingly.

The trial judge rendered judgment, holding the patent invalid on all the defenses pleaded, and awarded to Defendants attorneys' fees in the amount of \$237,062.50 and costs in the amount of \$51,943.03.

Defenses and Findings.

At the time of final argument the District Judge announced, in substance, that he did not find that the acts of Dr. Garbell before the Patent Office were wrongful or willful or that there was any fraud on the Patent Office.

Among the defenses on which the District Court made findings were the following:

1. A few non-consecutive pages from an unpublished aerodynamic proposal report of the Curtiss-Wright Corporation, obtained by the Defendants from the printed transcript on appeal of the previous infringement suit (94 F.Supp. 843, S.D. Cal. 1950), in which the patent was held valid, but which was reversed on the ground of shopright. There was no explanation, in either trial, why about 120 pages were missing. (204 F.2d 946. 9th Cir. 1953).

2. Copies of documents, such as: "Zien Thesis, Technical University of Berlin," "Lachmann article in the Journal of the Royal Aeronautical Society," "Lombard article in the Journal of the Aeronautical Sciences," "N.A.C.A. Technical Report No. 703," "Article written by Dr. Garbell on the 'Pinguino' sailplane in the Italian periodicals 'Le Vie dell'Aria' and 'L'Aquilone'," all of which are also contained in the said printed transcript of record on appeal in the previous infringement case.

3. The Cronstedt patent, which is cited in the Patent-Office "file wrapper" and on the face of the patent in suit, and which, hence, was considered by the Examiner in the Patent Office.

4. The contract for a 3/40th-scale non-flyable miniature experimental wind-tunnel model of an XB-46 airplane design with a Garbell wing shape, sold solely for experimental wind-tunnel testing.

5. A suggestion for an exchange of classified data between aircraft manufacturers which was never carried out.

6. An alleged offer of sale by Dr. Garbell to a Captain Diehl of the Bureau of Aeronautics of the U. S. Navy and/or others. This refers to a discussion between Dr. Garbell and Captain Diehl regarding a possible interest by the U. S. Navy in a tailless airplane configuration.

7. Prior knowledge and publication attributed to a classified intramural report of NACA wind-tunnel tests of a classified Consolidated-Vultee design-model wing following a confidential discussion between Dr. Garbell and an employee of the NACA who was in charge of the Consolidated-Vultee wind-tunnel test.

8. Alleged printed publication more than a year prior to the filing date of the application for the patent in suit by submittal of a single manuscript to the Editorial Board of the Journal of the Aeronautical Sciences, for consideration of possible subsequent publication in the Journal (not published until much later, well within the statutory year).

9. Inoperativeness and Indefiniteness.

10. Obviousness.

11. Fraud in the Patent Office and/or bad faith in the litigation.

12. Estoppel against the present Defendants by reason of their involvement in the previous litigation, Maurice A. Garbell, Inc. et al. v. Consolidated-Vultee Aircraft Corporation, etc., supra, through the activities of the Manufacturers Aircraft Association, of which the present and the past defendants were and are co-owners and members.

All of the defenses were sustained by the District Court, even though, on "fraud," the District Court held, "no fraud," but some unspecified and unsubstantiated "lack of candor, less than good faith, etc."

The Court of Appeals summarily sustained the District Court's Findings of Fact and Conclusions of Law "in all respects," and sustained the District Court's finding of "bad faith" and award of attorneys' fees in the amount of \$237,062.50 and costs in the amount of \$51,943.03.

REASONS FOR GRANTING
THE WRIT OF CERTIORARI.

To hold a case "exceptional" because of alleged misconduct before the Patent Office or in the litigation, there must be "clear, unequivocal and convincing" evidence of a "willful act * * * which rightfully can be said to transgress equitable standards of conduct."

United States v. American Bell Telephone Co., (1897)
167 U.S. 224, 251;

Pfizer, Inc. v. International Rectifier Corp.
(8th Cir. 1976) 538 F.2d 180, 186-187;

Schnadig Corp. v. Gaines Mfg. Co. (6th Cir. 1974)
494 F.2d 383, 391; and

Monsanto Co. v. Rohm & Haas Co. (3d Cir. 1972)
456 F.2d 592, 601, fn. 14, certiorari denied (1972)
407 U.S. 934.

Section 282 of Title 35 of the United States Code provides:

"A patent shall be presumed valid. The burden of establishing invalidity of a patent shall rest on a party asserting it."

In order to have a patent held invalid, there must be "clear and convincing" proof to overcome the strong presumption of validity of the Statute. Cantrell v. Wallick, 17 U.S. 689, 29 L.Ed. 1917, and subsequent decisions by this Honorable Court requiring "clear and convincing" proof.

The decisions of the court below evade these requirements in both respects and punish the patent holders for seeking to uphold their patent rights. The question is an important one. It involves not only a basic disregard of a congressional mandate, but an in terrorem effect on small inventors who dare to assert their patents against large manufacturers.

The patent was sued upon in 1948, and its validity was sustained over the defenses of alleged prior art of the Curtiss-Wright 23 and 21-B airplanes and over alleged prior publications and alleged prior knowledge (Maurice A. Garbell, Inc. v. Consolidated-Vultee Aircraft Corporation, supra.) On appeal, it was held that Consolidated-Vultee ("CVAC") had a shopright, but that did not tell the patent holders that they did not possess a valid patent.

The patent holders were advised by their attorneys, who were experienced in aviation matters, to file a suit for infringement against these Defendants. There was no other way to establish the actual shape of the wings manufactured by Defendants, except by court-ordered discovery proceedings. Even that discovery was strenuously opposed by Defendants for nearly ten years, thereby causing colossal expenses to plaintiffs. The plaintiffs proved infringement by the wings of the Douglas DC-8 airplanes. Hence, it is unconscionable to say that the suits were brought "improvidently."

Under the rule of the requirement for "clear, unequivocal and convincing evidence," the holding by the Court of Appeals of "circumstantial evidence of intransigence and vexatious behavior by the plaintiffs which ran up costs," in the absence of any findings by the District Court of any specific willful act by plaintiffs, is also in conflict with Pfizer, Inc., v. International Rectifier Corp., supra, especially since the only sanction ordered by the Special Master, during pretrial discovery, was against Defendant Boeing, wherein the Special Master stated:

"Defendant's delay in disgorging the information has in all events been unreasonable and I have no doubt that it has been deliberate." (Emphasis added.)

Nothing occurred between 1950 and 1953 to disabuse the patent holders of their understanding that their patent was and is valid. In 1963, Plaintiffs sued The Boeing Company and the Douglas Aircraft Company for

infringement of the patent. In 1972, the trial court held the patent in suit invalid because of alleged prior art and prior publication and knowledge.

As to the prior art, the Curtiss-Wright wings had been held twenty years before to be non-anticipatory. In the current actions, the Special Master, in his Findings after a seven-week-long hearing, held that "the evidence is less than one would desire to determine definitively and free from doubt what shape the CW-23 airfoil probably took."

As to the prior publications and prior knowledge, all except the Zacher article had been held twenty years before not to be anticipatory, and the District Court, at that time, held that the Garbell wing was non-obvious over them. The Zacher paper was not in the previous suit in 1950, but is a "manuscript" prepared for the aeronautical storm-troop cadres of the Nazi party, allegedly in 1944, by a Dr. Zacher.

On the question of the alleged prior publications, the Court of Appeals held:

"Although no other wing description exactly duplicated the Garbell wing, the (district) court found that a consideration of the totality of the prior publications would render the design obvious to a skilled member of the airframe industry." (546 F.2d 297, 299. Emphasis added).

All of the alleged prior publications, except the Zien, Lachmann, and Zacher papers, had been considered and found wanting by the Patent Office, and all except Zacher were found wanting again in 1950 in the Consolidated-Vultee trial in the same District in which the instant Boeing and McDonnell-Douglas suits were tried. The Zacher article was not produced by the defendant in the 1950 case; it was first produced in the instant cases by the Boeing and Douglas Defendants. The Zacher paper is in the German language. No English-language translation was ever offered. The Zacher paper

was never published. It does not describe a Garbell wing shape, and the Special Master characterized it as meaningless in his findings which were adopted by the District Court.

Petitioners respectfully submit that to find this patent invalid and the patent holders in bad faith on such flimsy "evidence" clearly demonstrates an utter disregard by the lower courts for the presumption of patent validity and the requirement for clear and convincing evidence to overcome the strong presumption of patent validity.

The findings of the district court cannot be accepted as a fair or truthful characterization of the facts or the evidence. Essentially, the findings were copied from those drafted and proposed by Defendants in violation of the law laid down by this Honorable Court. United States v. El Paso Natural Gas Co. 376 U.S. 651, 656-657. S.Ct. 1044. 12 L.Ed.2d 12. Kelson v. United States (10th Cir. 1974) 503 F.2d. 1291, 1294-1295. One would not know from the opinion of the District Court, for example, that the Special Master had ordered only one sanction in pretrial discovery, and that one sanction was against the Defendants, in the language recited supra.

The decision itself is replete with errors, contradictions, and inconsistencies, obfuscated by prolixity. To cite but a few examples that will illustrate the utter confusion of the findings:

a. The District Court found that the article published on the "Pinguino" sailplane built and flown by Dr. Garbell in Italy is a form of anticipation (Finding H10); that the "wing of the Pinguino sailplane is not covered by any of the claims of the patent in suit" (Finding H12); and that the patentee (the designer and builder of the Pinguino sailplane) did not reduce to practice his invention at any time.

b. The District Court found that the Garbell invention had never been reduced to practice; yet the District Court found that the sale of a non-flyable miniature experimental wind-tunnel model of an airplane design

with a Garbell wing shape, sold solely for experimental wind-tunnel testing, constitutes an airplane or an airplane wing being "on sale" more than one year prior to the filing date of the application for the patent in suit, so as to invalidate the patent. This latter new rule is already being cited as "confusing law," as is indicated in the photocopy, reproduced here on the next page, of page 623 of the October 1974 issue of the Journal of the Patent Office Society. Sooner or later some of the other defenses so affirmed, contrary to well-established law, are bound to be similarly cited as precedent.

c. The findings of the Special Master and the District Court on the "Curtiss-Wright Development" would provide a precedent for holding a patent invalid on "evidence less than one desires to determine definitively and free from doubt." This is a radical departure from the rule of law in Cantrell v. Wallick, *supra*, and subsequent decisions by this Honorable Court requiring "clear and convincing" proof to overcome the strong presumption of patent validity under the Statute, 35 U.S.C. 282.

d. The holding of obviousness by the District Court, as affirmed "in all respects" by the Court of Appeals, would be held as a precedent for the proposition that theoretical papers and doctoral theses which were advocating on paper wing shapes creating so-called "root-stall" characteristics, without proof of operativeness in an actual airplane, could negative novelty of a concededly different and novel wing shape which creates the novel broad-inboard-panel wing-stall characteristic of the Garbell wing.

The latter newly established precedent, disregarding novel result, is in conflict with the rule stated by this Honorable Court in United States v. Adams, *supra*, at p. 714, namely,

"An inoperative invention or one which fails to achieve its intended result does not negative novelty. Smith v. Snow. 294 U.S. 1, 17, 55 S.Ct. 279, 79 L.Ed. 721 (1935)."

vention has been held to be a sufficient reduction to practice where the inventor presented his ideas fully on paper to an architect who was satisfied that the invention would accomplish its intended purpose, and one skilled in the art could readily have built and used the invention (a frame).³⁴ And sale of a wind tunnel model of an airplane wing was held to be a bar to the patent for the wing.³⁵

Thus, there appears to be either some confusion or a split of opinion as to whether an invention is complete, or perfected, for sale purposes when it has been reduced to practice (i.e., operative to accomplish the desired result in a practical way) or whether it must have a commercially acceptable structure and operation. This seems to imply a difference in the interpretation of what the term "in a practical way" signifies. The author believes that it is more logical for on sale purposes that, if the invention is to be used commercially, it should have a commercially acceptable structure and operation. However, this does not imply that there must be a working model, but only that the form of the invention, even if it is only on paper, be acceptable to prospective purchasers who desire to use the invention in its intended environment. E.g., if it is a machine which manufactures paper cups, a paper-cup manufacturer would buy it to use to manufacture paper cups which he can sell commercially.

An experimental use may be by one other than the inventor if the inventor maintains control over the use.³⁶

This is also true where the invention is sold; if the purpose of the sale is primarily experimental and the profit is only incidental, the use will be held to be experimental.³⁷ However, there is a case³⁸ in which the court

³⁴ Langzett v. Marmet, D.C., W. Wisc., 141 USPQ 903.

³⁵ Garbill v. Boeing, D.C. S. Cal., BNA Patent, Trademark & Copyright Journal #150, pg. A-1.

³⁶ Electric Storage Battery v. Shimadzu, 59 S. Ct. 675, 307 U.S. 5, 613; cert. den. 62 S. Ct. 916, 315 U.S. 822.

³⁷ Sterling Products v. Crest Manufacturing, D.C., Mich. 166 USPQ 129.

³⁸ Cali v. Eastern Air Lines, CA 2, 169 USPQ 753.

A fortiori the rule of the Adams case applies where the shape of the accused DC-8 airplane wing embodying the Garbell wing shape was characterized by defendant Douglas' wing designer as "revolutionary."

e. The District Court's findings on inoperativeness and indefiniteness, as affirmed "in all respects" by the Court of Appeals, are also bound to be cited as precedent that hundreds of successfully operating airliners, which were held in the prior patent-infringement case against Consolidated-Vultee to be infringements (Maurice A. Garbell, Inc., et al. v. Consolidated-Vultee Aircraft Corporation, supra) and the findings of the Special Master that defendants' DC-8 airplane wings have the shape of the Garbell wing patent, are not sufficient to prove that the Garbell invention is operative. Freedman v. Overseas Scientific Corp., supra. (35 U.S.C. 112).

f. The District Court's finding, which, together with its affirmation by the Court of Appeals "in all respects," eventually will be cited as precedent that the submittal of a single draft manuscript to the Editorial Board of a professional society more than one year prior to the filing date of a patent application is a "printed publication," gives a new, and unexpected, interpretation of the statutory provision regarding a "printed publication." Application of Tenney, supra. (35 U.S.C. 102(a)).

In assessing over a quarter of a million dollars against the patent holders in attorneys' fees and costs, the court brutally penalized petitioners in clear violation of the rules of law concerning proof of alleged misconduct before the Patent Office or in the litigation.

As stated in Pfizer, Inc. v. International Rectifier Corp., 538 F.2d 180, 186 (8th Cir. 1976):

".... we note that the standard is not one of strict liability for innocent or even negligent omissions or misstatements before the Patent Office. Schnadig Corp. v. Gaines Manufacturing Co., 494 F.2d 383, 393 (6th Cir. 1974). Rather, to result in refusal to enforce

a patent, the misconduct must be accompanied by "some element of wrongfulness, willfulness, or bad faith." Parker v. Motorola, Inc., 524 F.2d 518, 535 (5th Cir. 1975); see Precision Instrument Manufacturing Co. v. Automotive Maintenance Machinery Co. 324 U.S. 806, 814-815, 65 S.Ct. 993, 997-998, 89 L.Ed.1381 (1945) (a "willful act * * * which rightfully can be said to transgress equitable standards of conduct"). This requirement of proof has been uniformly applied in infringement actions by a majority of the circuits to claims of both fraud¹³ and lesser inequitable conduct.¹⁴ Moreover, proof of misconduct under either theory must be established by 'clear, unequivocal and convincing' evidence. United States v. American Bell Telephone Co., 167 U.S. 224, 251, 17 S.Ct. 809, 42 L.Ed. 144 (1897); accord, Schnadig Corp. v. Gaines Manufacturing Co., supra, at 392; Monsanto Co. v. Rohm & Haas, supra, at 601 n.14."

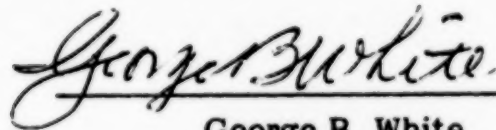
: In the cases at bar the rulings of the District Court and the Court of Appeals are in conflict with this rule.

CONCLUSION.

Petitioners respectfully submit that the Court of Appeals in these actions, as herein demonstrated, departed so far from the accepted and usual course of judicial proceedings, and so far sanctioned such a departure by the District Court herein, as to call for the exercise of this Honorable Court's power of supervision to remedy the nationally confusing and damaging inconsistencies between the Court of Appeals for the Ninth Circuit and courts of appeals in other circuits, as well as this Honorable Supreme Court and the Court of Claims.

Petitioners further respectfully urge that this Honorable Court protect the fundamental rights of petitioners in the interest of justice and agree to review the actions of the lower courts on writ of certiorari.

Respectfully submitted,



George B. White
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1095 Market Street
San Francisco, CA 94103
(415) 621-7065

Attorney for Petitioners

March 22, 1977.

PROOF OF SERVICE.

I, George B. White, attorney for Maurice A. Garbell, Inc., and the Garbell Research Foundation, Petitioners herein, and a member of the Bar of the Supreme Court of the United States, hereby certify that, on the 24th day of March, 1977, I served copies of the foregoing Petition for a Writ of Certiorari to the Supreme Court of the United States on the several parties thereto, as follows:

1. On The Boeing Company, Defendant, by mailing three copies in a duly addressed envelope, with first-class postage prepaid, to its attorneys,

PERKINS, COIE, STONE, OLSEN & WILLIAMS,
J. PAUL COIE,
1900 Washington Building,
Seattle, Washington 98101.
(206) 682-8770

2. On the McDonnell-Douglas Corporation, Defendant, by mailing three copies in a duly addressed envelope, with first-class postage prepaid, to its attorneys,

LOUIS LIEBER, JR.,
WALTER J. JASON,
3000 Ocean Park Boulevard,
Santa Monica, California 90405.
(213) 399-9311, Extensions 4275.

3. On The Boeing Company and the McDonnell-Douglas Corporation, Defendants, by mailing three copies in a duly addressed envelope, with first-class postage prepaid, to their attorneys,

HAHN, CAZIER, THORNTON, HOEGH & LEFF,
RICHARD B. HOEGH,
RUSSELL P. KUHN,
Crocker Citizens Plaza,
611 West Sixth Street, Fourteenth Floor,
Los Angeles, California 90017.
(213) 628-6151.

It is further certified that all parties required to be served have been served.

George B. White

George B. White,
Attorney for Petitioners,
806 Grant Building,
1095 Market Street,
San Francisco, California 94103.
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In the Supreme Court

OF THE
United States

Supreme Court, U. S.

F I L E D

MAR 28 1977

OCTOBER TERM, 197

MICHAEL RODAK, JR., CLERK

No. 76-1425

MAURICE A. GARBELL, INC.,
and
GARBELL RESEARCH FOUNDATION
Petitioners,

v.

THE BOEING COMPANY,
Respondent.

and

MAURICE A. GARBELL, INC.,
and
GARBELL RESEARCH FOUNDATION
Petitioners,

v.

McDONNELL-DOUGLAS CORPORATION,
Respondent.

**PETITION FOR WRIT OF CERTIORARI
to the United States Court of Appeals
for the Ninth Circuit**

**APPENDICES A, B, AND C
"OPINIONS BELOW"**

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March 22, 1977.

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March 22, 1977.

APPENDIX A

MEMORANDUM DECISION, FINDINGS OF FACT,
CONCLUSIONS OF LAW AND
ORDER FOR JUDGMENT

Federal Supplement, Volume 385, Pages 1 through 57.

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FEDERAL SUPPLEMENT VOLUME 385

Page 1

MAURICE A. GARBELL, INC., et al.,
Plaintiffs,

v.

The BOEING COMPANY, Defendant.

MAURICE A. GARBELL, INC., et al.,
Plaintiffs,

v.

McDONNELL DOUGLAS CORPORATION, Defendant.

Civ. A. Nos. 63-658-AAH, 63-659-AAH.

United States District Court, C.D. California.

Oct 1, 1973.

Actions were brought for infringement of patent No. 2,441,758 which related to design and construction of a fluid-foil lifting surface and was directed to shape of aircraft wings. The District Court, Hauk, J., held that claims 1, 2, 3 and 7 were invalid because of lack of novelty and utility, because purported invention was anticipated, because subject matter was obvious to one skilled in art at time of alleged invention, and because teachings were insufficient and claims were ambiguous, and that continued prosecution of actions through trial in bad faith made case an exceptional one warranting award of attorneys' fees.

Judgment accordingly.

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Morris Lowenthal and George B. White, San Francisco, Cal., for plaintiffs.

Hahn, Cazier, Hoegh & Leff, Richard B. Hoegh and Russell P. Kuhn, Los Angeles, Cal., for defendants.

MEMORANDUM DECISION FINDINGS OF FACT,
CONCLUSIONS OF LAW AND ORDER FOR JUDG-
MENT

HAUK, District Judge.

PRELIMINARY FINDINGS AND MEMORANDUM
DECISION.

On June 6, 1963, some two and one-half years after Dr. Garbell became convinced that the Boeing 707 and the Douglas DC-8, on each of which he had taken one flight as a passenger, must incorporate his wing design since each exhibited such excellent flying qualities, the Garbell plaintiffs filed these actions against the defendants Boeing and Douglas.

The cases were assigned to Judge Peirson Hall who, on his own motion, dismissed each with prejudice. Subsequently, on plaintiffs' application, Judge Hall permitted amended complaints to be filed. Defendants' answers asserted non-infringement of the patent, invalidity of the patent and laches.

Discovery was initiated by the Garbell plaintiffs in the form of interrogatories directed to both defendants. The defendant Boeing moved to dismiss for want of venue and this motion was denied. Thereafter both defendants noticed the deposition of Dr. Garbell, the patentee and president of plaintiff corporations. At that early stage of the cases, the Court was given an indication of the discovery problems which would later ensue when the plaintiffs moved to prevent the taking of Dr. Garbell's deposition.

In 1964, the cases were transferred to Judge Francis Whelan who had been newly appointed.

The cases had been started with plaintiffs being represented by Wallace & Parker, Charles Parker, Esq. and Ronald Rattner, Esq. of San Francisco. On the motion of plaintiffs, Wallace & Parker and Charles Parker, Esq. were substituted out and the plaintiffs' new lawyers were Morris Lowenthal, Esq. and Jerome Field, Esq. of the firm of Lowenthal & Lowenthal, and Ronald Rattner, Esq. of San Francisco.

Defendants were represented by the firm of Older, Cazier, Preston & Hoegh (now Hahn, Cazier, Hoegh & Leff) and Richard B. Hoegh, Esq. of that firm in Los Angeles. In addition to Mr. Hoegh's firm, defendant Boeing was represented by J. Paul Coie, Esq. of Seattle, Washington, and defendant Douglas was represented by Walter J. Jason, Esq. of Los Angeles.

The first affirmative action taken by the plaintiffs' new lawyers (Messrs. Lowenthal, Field and Rattner) was to move to stop further discovery on behalf of the defendants for a period of several months. In the meantime, the plaintiffs had begun document inspection at the Long Beach plant of the defendant Douglas.

These cases were transferred to Judge Irving Hill in 1965. The defendant Boeing filed a motion to transfer the action against it to Seattle, which motion was denied by the Court.

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Both defendants then moved to have a Special Master appointed to supervise discovery in these actions. At that time the docket entries in the Boeing action alone filled five pages of the Court's docket book. The Court granted the motion stating:

"The Court, being duly advised in the premises, finds that an exceptional condition exists requiring that discovery be had under the supervision of a special master."

On September 27, 1965, the Order re Appointment of a Special Master was signed and Robert Henigson, Esq. of the law firm of Lawler, Felix and Hall in Los Angeles was appointed to supervise all pending and future discovery. The plaintiffs moved to vacate this Order and their motion was denied on November 22, 1965. Plaintiffs then moved for leave to file Petition for Writ of Mandamus in the Ninth Circuit asserting, among other things, the bias of Mr. Henigson. The motion was denied by the Ninth Circuit and the discovery matters were from that time presented to Mr. Henigson. The discovery matters presented to Mr. Henigson for schedul-

ing or determination filled practically fourteen pages of the Court's docket.

On August 1, 1966, these cases were transferred to Judge A. Andrew Hauk.

In October 1966, defendant Boeing filed a motion for an early and separate trial on the issue of infringement. The Garbell plaintiffs vigorously opposed Boeing's motion.

On January 20, 1969, the cases were set for trial in May of the following year. The parties were given until November 1, 1969, in which to complete all discovery in both cases, including document inspection on the DC-9 aircraft at the Douglas Long Beach plant and document inspection at the Boeing plant in Seattle. With respect to the Boeing discovery, apart from a request by letter made to Boeing's Seattle counsel for inspection of a few limited items, the plaintiffs had not initiated any document inspection at the Boeing plant and had not taken the depositions of any wing designers at Boeing in order to assess their infringement allegations against Boeing in the five and one-half years that the case had been pending. Indeed, the document inspection ordered by the Court on January 20, 1969, was done on the Court's own motion. /(Page 33 of the January 20, 1969 transcript)/.

On January 20, 1970, the parties were in Court on plaintiffs' motion to expand the reference to the Special Master to include the taking of evidence on all issues to be determined at trial. The Court expanded the order of reference to the Special Master to include the so-called geometry issues relating to the accused Boeing and Douglas aircraft and to the aircraft which defendants relied upon in support of any of their invalidity defenses.

Trial before the Special Master commenced on June 16, 1970, and lasted thirty days. The Special Master's report was filed December 31, 1970, and covers certain airfoils on the DC-8s and four prior art aircraft, the Curtiss-Wright Models 21B and 23, the Grumman F6F, and a German sailplane, the D-30 Cirrus. Other DC-8 airfoils and the remaining invalidity aircraft were to be

covered in a supplemental report by the Special Master. During the hearing before the Special Master, on cross-examination, plaintiffs, through Dr. Garbell, dropped their charge of infringement as to the DC-9 aircraft wing basing their decision to do so upon evidence supplied to them long before they subjected Douglas to a complete document inspection on the DC-9.

In mid-January, 1971, the plaintiffs filed two "motions for action" relating to the DC-8 findings in the Special Master's report and to the findings on the invalidity aircraft. These motions, in effect, were motions for partial summary judgment seeking a determination that the DC-8 wings infringed, based on the Special Master's findings and that the patent was valid over the prior art aircraft. The motions were denied and, following a hearing on objections to the

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Special Master's report, the report was modified by interlineation and filed.

On February 1, 1971, trial was scheduled to commence on June 1, 1971. Pretrial was set for May 3, 1971, and discovery was opened up for an additional month. During the weeks before the trial, the plaintiffs filed several motions for continuance which were denied. The Special Master filed his Supplemental Report on May 5, 1971, and on May 14, 1971, plaintiffs moved to remand for further findings by the Special Master on the DC-8 airplane wing on the grounds Douglas had supplied erroneous data to plaintiffs in 1964. The plaintiffs claimed they were surprised by their own evidence presented to the Special Master and contained in the Supplemental Report. The Court granted the motion.

On June 1, 1971, a few minutes before the trial was scheduled to commence, the plaintiffs filed a motion for recusal of the trial judge on the grounds of bias and prejudice. The moving papers were considered and the motion denied. The parties spent the remainder of the Court time on June 1st attempting to settle the actions.

On June 2, 1971, trial of the actions commenced. The validity or invalidity of the patent was to be tried first, followed by Douglas infringement issues, to be followed by Special Master hearings on Boeing wing geometry and Court trial on Boeing infringement issues.

The plaintiffs put their patent in evidence and, without availing themselves of the opportunity to present further evidence as to the invention, rested. The defendants called Dr. Garbell as their first witness under Rule 43.

On Friday, June 4, 1971, the plaintiffs filed a Petition for Writ of Mandamus seeking review of the denial of their motion for recusal of the trial judge and on June 9, 1971, the Ninth Circuit Court of Appeals stopped the trial pending determination of the Petition for Writ of Mandamus. On August 12, 1971, the Court heard the petition and denied it on the same day.

On September 20, 1971, at a status hearing, Mr. Lowenthal, who had represented the plaintiffs since 1965, stated that Mr. Jerome Field, who had been co-counsel with him, had removed himself from the case. A hearing was held on November 1, 1971, substituting Jerome Field and Ronald Rattner out of the case and granting each of the attorneys a lien on any recovery made by plaintiffs in these actions. Plaintiffs appealed from this order, which appeal is now pending in the Ninth Circuit.

On November 20, 1971, at a further hearing, Mr. Henigson was ordered to proceed with the remand requested by the plaintiffs and resumption of the trial was set for March 7, 1972.

On February 3, 1971, after obtaining a 58 day extension of time in which to file a Petition for Writ of Certiorari in the United States Supreme Court to review the Ninth Circuit's ruling on the Petition for Writ of Mandamus, the plaintiffs filed the Petition for Writ of Certiorari together with an application for a stay of the trial pending determination of the application for a writ. The defendants filed their opposition to the stay

application in the Supreme Court on the same day and the stay was denied by Mr. Justice Douglas on February 14, 1972.

The Special Master had set the trial of issues raised by the remand for February 7, 1972. The circumstances surrounding the setting of the trial date were described by Mr. Henigson in his order to show cause as to why the remand should not be dissolved on the grounds of lack of communication and cooperation from the plaintiffs in the following language:

"IT IS HEREBY ORDERED that the parties show cause before the Special Master, if any they have, on Monday, March 6, 1972, at 10:00 a.m. at Room 800, Standard Oil Building, 605 West Olympic Boulevard, Los Angeles, California, why he Special Master

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should not submit his final report to the above entitled Court without holding an evidentiary hearing to resolve the factual issues in dispute and without making the findings of fact contemplated by the May 24, 1971 order, for the reasons that all efforts directed to that end are frustrated by plaintiffs and that there is no reasonable prospect that the work can be accomplished in the foreseeable future."

Leading up to the Order to Show Cause, the Special Master observed in Letter No. 95, dated November 18, 1971:

"I concede also that I think the difficulty imposed upon any attorney or firm required to stand by indefinitely but always at the ready, pending plaintiffs' obtaining trial counsel they think adequate to the task, is utterly intolerable."

In his Letter No. 100, the Special Master stated:

"I cannot refrain from observing that the delays incurred in bringing this phase of the litigation to a close have been intolerable and are in large part attributable to unwarranted demands that counsel and Dr. Garbell be inconvenienced in the prosecution of the litigation which plaintiffs commenced." Dated December 30, 1971.

On February 1, 1972, the Special Master reported to the Court in Letter No. 102 the following:

" . . . We have the astounding situation in which: plaintiffs desire to defer indeterminately any hearing pertaining to the geometry issues which, by their motion and the Court's order, were made a matter of reference to me as Special Master; and, defendants are anxious to have the matter heard and determined at the earliest possible time. My own view of the matter is that plaintiffs' counsel are entirely competent to represent plaintiffs in the action, that there are not serious prospects as (if, indeed, there are any serious endeavors to obtain) substitute counsel for plaintiffs and that, if plaintiffs' counsel have the time and energy to generate the copious paperwork recently filed with the respective clerks of the district court, the court of appeals and the Supreme Court, they can find the time and energy to attend a short hearing before me. Further, as you know, there is outstanding a Court order requiring that we proceed with deliberate speed in the completion of the work remaining to be done under my May 24, 1971 order. While "deliberate speed" has been variously construed, I do not think deferral of the hearing for an indeterminate period of time could possibly fit within any permissibly stretched meaning of the term."

At one Court appearance relating to the Special Master's proceeding, the plaintiffs were represented by Mr. John R. Jacobson from the Lowenthal & Lowenthal firm and on the day the Order to Show Cause was scheduled to be heard by the Special Master, March 6, 1972, plaintiffs were represented by Mr. George White, who appeared, but was not prepared to proceed and was not accompanied by Dr. Garbell or any other witnesses.

On March 7, 1972, trial re-commenced and in due course the Supreme Court denied the Petition for Writ of Certiorari. The Court observes that the actions of the plaintiffs in January and February required the defendants to prepare for trial on March 7, 1972, when the defendants could reasonably expect that plaintiffs would apply for a stay of the trial pending determination of their Petition for Writ of Certiorari and, at the same

time they were preparing for trial before the District Court, defendants would be required to prepare an opposition to the Petition for Certiorari. At the same time, defendants were required to prepared for a hearing before the Special Master scheduled to last several days commencing February 7, 1972, for a hearing requested by the plaintiffs in May of 1971, while the plaintiffs had no intention of showing up ready to proceed on the scheduled date.

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The trial on the validity issues took 23 Court days and concluded June 2, 1972. Broadly, the defendants contended that the patent was invalid as being not "new or useful" under 35 U.S.C. sec. 101, that the purported invention was anticipated under 35 U.S.C. sec. 102, that the subject matter of the patent was obvious under 35 U.S.C. sec. 103, and that the teachings of the patent were insufficient and the claims ambiguous under 35 U.S.C. sec. 112.

The patent in suit entitled "Fluid-Foil Lifting Surface", No. 2,441,758, names Maurice A. Garbell as the inventor. The application for the patent was filed July 16, 1946, and the patent issued on May 18, 1948.

The patent has been assigned to two corporations, Maurice A. Garbell, Inc. and Carbell Research Foundation, whose major asset is the patent.

Airplane wings are "lifting surfaces"; and in this action the accused devices are the wings of jet transports manufactured by the two defendants, Boeing and Douglas, later McDonnell Douglas.

The principal object of the patent in suit is to design and construct a wing which causes the initiation of stall to occur at or near the mid-semispan of the wing, and to spread inboardly more quickly than outboardly. This object and the patentee's solution are not new.

The patent utilizes what Dr. Garbell, on occasion, called the tri-section wing principle in order to obtain a wing which would not exhibit the dangerous stalling characteristics attributed by Dr. Garbell to the prior art aircraft.

In the prior art aircraft construction it was customary for wing designers to choose a cross-section, or airfoil section, shaped for the wing tip and to choose another cross-section, or airfoil section, shaped for the wing root. The root section was typically located at the side of the body where the wing is attached to the fuselage or at the center line of the airplane where the two ends of the airplane wing were bolted together. The wing surface between the wing tip and wing root were then generated by a technique known as straight-line fairing between the wing root and the wing tip. The technique was similar to that of rolling up a piece of paper to form a cone with the tip section being thought of as the small end of the cone and the root section being thought of as the large end of the cone.

The claims of the patent here in issue, Claims 1, 2, 3 and 7, utilized a third or interjacent section along the wing semispan. This third section is different from that which would be found in the wing at the wing station chosen for the interjacent section if the wing were generated by straight-line fairing between the root and tip sections.

A tri-section wing shape is generated by drawing straight-line elements or allowing the straight-line fairing technique between the wing root and the interjacent section forming what is called the inboard panel, and by utilizing the straight-line fairing technique between the interjacent and tip sections to define the shape of what is called the outer panel of the wing. As many panels as the designer desires may be generated in this way between the wing root and the wing tip to form the entire wing surface.

In the claims of the patent, the airfoil sections for these various stations, the root, the tip and any interjacent section, is defined solely by what is called in the claims "mean line camber". In the claims here in issue, the mean line camber of the interjacent section must be greater than that which would be found in the old two-section wing generated by straight-line fairing between the root and the tip. The mean line camber of the root

section must be smallest in value, and the mean line camber of the tip section must be the greatest in value.

Other claims of the patent not here in issue, cover wings in which the camber of the interjacent section is less than that obtained by straight-line fairing between the root and the tip sections.

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In another patent obtained by Dr. Garbell, the camber of the interjacent section is greater than that at the tip section.

The combined coverage of the two patents thus encompasses all wings except those which Dr. Garbell conceded to be old.

In 1925, an inventor by the name of Cronstedt obtained a patent on a wing shape. His wing was defined by a tip section and a root section. The tip sections had the greatest camber, as is the case in the claims of the patent here in suit, and the root section had the least camber, as is also the case in the claims of the patent here in suit. The Cronstedt patent drawing depicted an interjacent section, but did not disclose whether the interjacent section in the drawing was that which you would find in a wing by straight-line fairing between the root and the tip sections, or something different. If it were something different, it would be covered by one of the claims of Dr. Garbell's patent. Whether Mr. Cronstedt knew more than he understood about the use of an interjacent section in that early wing is a matter of conjecture.

Other claims of the patent not here in issue, cover wings in which the camber of the interjacent section is less than that obtained by straight-line fairing between the root and the tip sections.

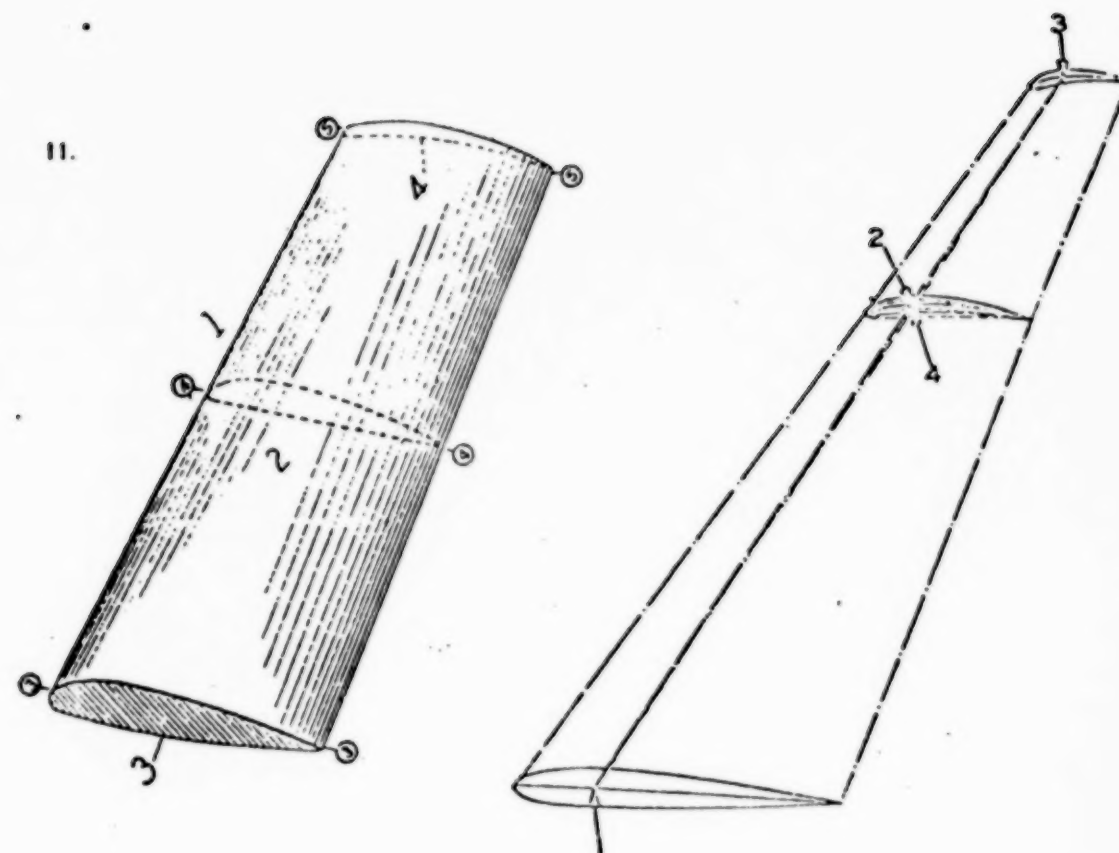
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Inventor
VALDEMAR CRONSTEDT.

Valdemar Cronstedt
Drawing

July 28, 1925.

Maxim A. Garbell INVENTOR

BY *Maxim A. Garbell*
ATTORNEYS

May 18, 1948.

Dr. Garbell's claims are an obvious variation of what is shown in Cronstedt.

By 1929 the National Advisory Committee on Aerodynamics (the NACA)

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set about systematizing the properties of airfoil sections and the relationship of camber and other parameters affecting the shape of the airfoil and relating such parameters to lift and drag. The earliest of such work systematizing data for the sections developed by the NACA was published in a Technical Report No. 460 in the early '30s. Professor Pinkerton, who appeared in this action as an expert on behalf of the defendants, was directly involved in the experimental and analytical work as an employee of the NACA. The work was undertaken to give aircraft designers a knowledgeable basis for deriving wing shapes so that lift and drag of the aircraft could be predicted with some accuracy. This and other publications of the NACA were distributed throughout the world and were available to Maurice Garbell when he was a student in Milan and working with others in designing the Pinguino sailplane.

Later studies of the NACA undertaken in the '30s utilized NACA sections in the construction of complete wings which were tested or in study wings approximating the planform of wings found in production airplanes which at the time did not have swept-back wings. One such wing had six interjacent sections which compares with Dr. Garbell's claims covering wings with one or more interjacent sections.

NACA continued its development and publication of airfoil data on through World War II with the publication of NACA Technical Report No. 824 co-authored by Mr. Ira H. Abbott, who appeared as one of the witnesses for the defendants in this action.

Independent researches were also studying the effects of airfoil parameters, such as mean line camber, in order to avoid tip stall on tapered monoplane wings being designed in the '30s and early '40s; e.g. Dr. Lombard, Exhibit BC.

All of these NACA publications included the relationship of the lift across the span of the wing to the maximum lift which could theoretically be generated at each station across the wing, similar to that shown in Figure 2 of the patent and called for by Claims 2, 3 and 7 of the claims in issue in this action.

As to whether or not the published NACA work made the subject matter of the patent in suit obvious, Professor Pinkerton said: "I can't read anything in the patent beyond what we knew and practiced in the '30s". /(T.R. 1021)/

In his work and in his published materials in evidence, Dr. Garbell utilized NACA airfoil sections and referenced NACA reports.

Dr. Garbell was employed at Consolidated Vultee in San Diego during World War II. There he worked on a tailless aircraft designed and proposed at least as early as 1944 using in it the wing configuration he later patented. Dr. Garbell gave a description of such wing without restriction to NACA which in turn distributed it to its various research facilities in early 1944.

About the same time, Dr. Garbell personally went to see Captain Diehl of the Navy in an attempt to sell the aircraft to the Navy on CVAC's behalf.

Dr. Garbell, while at CVAC and prior to July, 1945, also assisted in preparation of the proposal to the government for the sale of XB-46 aircraft. The proposal included a wing design covered by certain claims of the patent. Before July, 1945, Dr. Garbell was at the NACA wind tunnel at Ames, in California, in connection with wind tunnel work on the XB-46 CVAC had sold the government. The model incorporated a wing he had proposed and which was covered by claims of the patent.

Also while at CVAC and before the critical date of July 16, 1945, Dr. Garbell submitted his manuscript for a paper to be published by the Institute of the Aeronautical Sciences. The manuscript was seen by a great many people in the aircraft industry and in educational institutions. Dr. Garbell regarded the manuscript as a disclosure of the inven-

tion on which he subsequently obtained the patent at issue in this action.

More than a year after Dr. Garbell engaged in the foregoing selling activities and submission of his manuscript for publication, he applied for the patent in suit.

From the record it appears that Dr. Garbell took the prior art he was familiar with and proceeded to claim everything except that which he conceded to be old in an attempt to exact tribute from the aircraft industry. Using real property as an analogy, the metes and bounds of what he staked out in his two patents in effect claim everything on both sides of the river.

These considerations and others which appear in more detail in the Findings lead to the decision that the patent in suit is invalid for the reasons advanced by the defendants.

The Court adopts the foregoing preliminary statements as part of its Findings of Fact and makes additional Findings of Fact as follows:

FINDINGS OF FACT

A. GENERAL FINDINGS - THE PARTIES AND HISTORY OF THE SUIT

A1. Plaintiff Maurice A. Garbell, Inc. is a California corporation having its principal place of business at 1714 Lake Street, San Francisco, California.

A2. Plaintiff Garbell Research Foundation is a California non-profit corporation having its principal place of business at 1714 Lake Street, San Francisco, California.

A3. The president of the plaintiff corporations, Dr. Maurice A. Garbell, is the patentee.

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A4. The patent in suit, No. 2,441,758,¹ is entitled "Fluid Foil Lifting Surface". The patent application which issued as the subject patent was filed on July 16, 1946, and assigned to Maurice A. Garbell, Inc. on April 15, 1948. Said patent issued on May 18, 1948, to Maurice Adolph Garbell, assignor to Maurice A. Garbell, Inc. An undivided three-fourths (3/4ths) part of the entire right, title and interest in said patent was assigned to the Garbell Research Foundation on September 15, 1949.

A5. Defendant The Boeing Company is a Delaware corporation having a regular and established place of business at 5822 Avion Drive, Los Angeles, California.

A6. Defendant Douglas Aircraft Company, Inc. was a Delaware corporation having a regular and established place of business at 3000 Ocean Park Boulevard, Santa Monica, California. Defendant Douglas was merged with and into McDonnell Company on April 28, 1967. As of that date, McDonnell Company's corporate name was changed to McDonnell Douglas Corporation. McDonnell Douglas Corporation is a Maryland corporation and has a regular and established place of business at 3000 Ocean Park Boulevard, Santa Monica, California.

A7. The complaints in these two consolidated actions were filed in 1963 by the plaintiffs for infringement of their patent No. 2,441,758 by the defendants The Boeing Company and Douglas Aircraft Company, later McDonnell Douglas Corporation.

A8. This action arises under the Patent Laws of the United States, 35 U.S.C. Sections 271,² 281,³ and 28 U.S.C. Sec-

tion 1338.⁴ The jurisdiction and venue of this Court was determined by the fact that each of the defendants has a regular and established place of business within this District and their activities charged by plaintiffs to be infringements of the patent in suit were carried out in this District and elsewhere.

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A9. The patent in suit, No. 2,441,758, is entitled "Fluid Foil Lifting Surface" and is directed to the shape of aircraft wings. The accused devices manufactured by the defendant Boeing are the 707-320 B/C aircraft and the accused devices manufactured and sold by the defendant McDonnell Douglas are the DC-8 series aircraft. The claims of the patent at issue are Claims 1,^{4a} 2,^{4a} 3^{4a} and 7.^{4a} Plaintiffs allege that each of such claims is infringed by each of the defendants. The defense of invalidity is the only issue per the Amended Pretrial Conference Order, dated May 27, 1971.⁵ In that connection, defendants allege and have shown to the satisfaction of the Court that the patent and each of said Claims 1, 2, 3 and 7 are invalid because they do not meet the absolutely essential tests of validity: 35 U.S.C. 101,⁶ Novelty and Utility; 35 U.S.C. 102,⁷ No

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Prior Use or Sale and No Prior Publication; 35 U.S.C. 103,⁸ Non-Obviousness; and 35 U.S.C. 112,⁹ Definiteness.

A10. The patent was previously litigated in this District in an action by plaintiffs against Consolidated-Vultee Aircraft Corporation (CVAC), Civil Action No. 10930-Y. At the conclusion of the four day trial in that action, this Court, by Judge Yankwich, found the patent to be valid and infringed by CVAC and denied the defendants' claim of a shop-right. 94 F.Supp. 843 (S.D. Cal. 1950). The Ninth Circuit Court of Appeals, 204 F.2d 946 (9th Cir. 1953), found that the defendant had established a shop-right and declined to rule on whether the patent, or what it referred to throughout its opinion as the "alleged invention" was valid or infringed. Upon remand, Judge Yankwich dismissed the action with prejudice.

A-11. In the present action, on motion of defendants, a Special Master was appointed in 1965 to supervise discovery.

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A12. Judge Hill's order appointing Mr. Robert Henigson to serve as Special Master was challenged as an abuse of discretion and Mr. Henigson was challenged for bias in plaintiffs' Petition for Writ of Mandamus filed in the Ninth Circuit Court. The Court denied the Petition.

A13. During the discovery proceedings, Mr. Henigson held approximately 37 meetings with counsel and attended numerous depositions to supervise the discovery proceedings.

A14. In April, 1970, plaintiffs asked to have Mr. Henigson appointed to hear all evidence in the case. The motion

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was granted to the extent of the geometry relating to the accused Boeing and Douglas jet transport wings and wings relied upon by defendants in support of invalidity defenses.

A15. The Court reserved all remaining issues, including the issues of aerodynamics and interpretation of the patent, for trial by the Court.

A16. The trial before the Special Master commenced June 16, 1970, and lasted for thirty days. Eighteen witnesses testified and approximately 700 exhibits were received into evidence.

A17. The Report of the Special Master was filed on December 31, 1970, and adopted by the Court.

A18. The Special Master filed his Supplemental Report on May 3, 1971. It was adopted by the Court.

A19. Plaintiffs moved to remand on the grounds that Douglas had supplied erroneous data. The Court granted this motion on May 24, 1971.

A20. After repeated unsuccessful attempts to get plaintiffs to attend a hearing on remand issues, Mr.

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Henigson issued an order to show cause why remand should not be vacated and thereafter reported to the Court that the remand be vacated.

A21. In the spring of 1971, the plaintiffs filed repeated requests for a continuance of the trial.

A22. On June 1, 1971, the day scheduled for commencement of trial, plaintiffs filed a motion to disqualify Judge Hauk. This motion was denied and taking of testimony commenced on June 2, 1971.

A23. On June 4, 1971, the plaintiffs filed a Petition for Writ of Mandamus seeking review of the ruling on their motion. On June 9, 1971, pursuant to an order of the Court of Appeals, the trial was stopped pending determination of the petition.

A24. The petition was argued in the Court of Appeals on August 12, 1971, and denied the same day. Rehearing was denied on September 9, 1971.

A25. On November 1, 1971 the Trial Court rescheduled trial to commence March 7, 1972.

A26. Plaintiffs obtained a 58 day extension for a total of 148 days in which to file a Petition for Certiorari in the Supreme Court and approximately three weeks before trial, on February 3, 1972, filed their Petition for Certiorari on the recusal matter and concurrently filed in the Supreme Court a Petition for a Stay of the trial and on February 4, 1972, plaintiffs filed a like application in the Ninth Circuit. Both were denied and trial recommenced on March 7, 1972.

A27. Trial extended 23 court days, including that which commenced June 1, 1971. The record comprises approximately 4,000 pages of reporter's transcript and 50 volumes of papers filed with the clerk in connection with these two cases.

A28. At trial, plaintiffs put the patent in evidence and thereupon rested their case in chief. Defendants

called Dr. Garbell, the patentee and president of the plaintiff corporations, under Rule 43 and the following witnesses:

Professor Robert N. Pinkerton: Former Research Physicist for National Advisory Committee for Aerodynamics (NACA), Author of NACA Reports; Professor Emeritus, North Carolina State University.

Wesley T. Butterworth: Employed by North American Aviation on the Apollo Space vehicle; former employee of Curtiss-Wright and designer of the wings of the Curtiss-Wright Model 21B and Model 23.

Ira H. Abbott: Former Director of Research and Advanced Technology, National Aeronautics and Space Administration (NASA), Author of NACA Reports, Co-author of "Theory of Wing Section".

Al Riedler: Former Chief of Aerodynamics, Convair San Diego, during de-

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velopment of Convair 880 and 990 aircraft. Currently working for the City of San Diego.

Dr. Albert E. Lombard, Jr.: Ph.D. Aeronautics and Physics, Cal Tech, 1939; Former Director of Research and Staff Vice-President, McDonnell Douglas Corporation.

William T. Hamilton: Formerly with NACA, now employed by The Boeing Company; was Director of Technology on the SST.

Orville Dunn: Director of Aerodynamics, McDonnell Douglas Corporation.

A29. Plaintiffs' rebuttal comprised the testimony under Rule 43 of Mr. Glenn Orlob, Patent Administrator of The Boeing Company and Mr. Walter J. Jason, Patent Director of McDonnell Douglas Corporation, and the testimony of the following:

Dr. William Bailey Oswald: Ph.D. in Aeronautical Engineering, Cal Tech. Former Chief of Aerodynamics, Douglas Aircraft Company; Santa Monica Division.

Dr. Maurice A. Garbell: The patentee and president of plaintiff corporations.

A30. The parties jointly designated portions of the depositions of the following named witnesses. The designated portions were read in open court by the trial judge.

William E. Nickey: Was a test pilot for Curtiss-Wright. Flew Curtiss-Wright Models 21B and 23.

Charles W. Harper: Deputy Associate Administrator for Aeronautics, Office of Advanced Research and Technology, NASA.

Max Munk: Formerly with the NACA.

Theodore Theodorsen: Consultant in Aerodynamics.

James G. McHugh: Senior Staff Engineer, Dynasciences Corporation. Formerly with NACA and NASA.

James C. Sivells: Staff Engineer at the Aerodynamics Division of the Von Karman Gas Dynamics Facility, ARO, Incorporated.

Loren Facka: Supervisor of Financial Accounting, Convair Division of General Dynamics Corporation.

Orville Dunn: Director of Aerodynamics, McDonnell Douglas Corporation.

Harold F. Kleckner: Aerodynamicist and wing designer, McDonnell Douglas Corporation.

Harold T. Luskin: Former Douglas aerodynamicist, and with Lockheed Missiles and Space Company. Now deceased.

Thomas Neill: Chief of Technical Publications Branch of the Office of Advanced Research and Technology, NASA.

Hartley A. Soule: Formerly with NACA, author of several NACA reports.

B. DEFINITION OF TERMS USED IN THE PATENT.

B1. The patent in suit, United States Letters Patent No. 2,441,758, relates to the design and construction of a fluid-foil lifting surface. The term "fluid-foil lifting surface" is synonymous with "wing", "fin" or "blade", which produces lift when moving through a fluid such as air or water.

B2. The term "fluid-foil section" is synonymous in the art of aerodynamics with the term "airfoil section", and typically represents a cross-section of a wing.

B3. A controlled fluid-foil section is one which has been pre-selected by the designer to form a cross-section of the wing at a given station.

B4. The term "at the root", as used in the patent, and as interpreted according to standard industry practice at the time of the alleged invention, refers to the location at the plane of symmetry (longitudinal center-line) of the airplane, and possibly to a location at the wing-fuselage intersection. To the aero-

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dynamicist, the term "root" most commonly refers to a location at the plane of symmetry. Figures 2 and 3 of the patent in suit indicate that the "root" (Figure 2) is synonymous with the "center line" (Figure 3).

B5. The surface of wings is usually formed by fairing between controlled sections, i.e. from the station located at the root to the one located at the tip or from root to interjacent section and from interjacent section to the tip section.

B6. Mean line camber is a property of the mean line of an airfoil section, i.e., a line lying midway between the top and bottom of an airfoil section measured perpendicular to the mean line.

B7. An airplane in flight is sustained in the air by lift forces generated by the flow of air past the surface of the wings of the airplane.

B8. The "stall" of an airplane refers to a phenomenon in which the airflow over the upper surface of the wing separates from the surface, or ceases to flow in a pattern approximately conforming to the upper surface of the wing. An airfoil performs its normal function of generating lift most efficiently when the airflow over the foil is smooth rather than turbulent. The main flow remains "attached" to the surface of the foil. As the angle of attack increases, however, the airflow over the upper surface encounters difficulty in remaining smooth, "attached". A separation or stall occurs when the wing is forced to an angle of attack which is too high relative to the oncoming airflow.

B9. All wings will stall at some ascertainable angle of attack. The major factor which determines whether stall characteristics of an airfoil are acceptable is the degree to which the airplane is controllable during the stall.

B10. Stall or air separation causes the wings to lose their lift capability and as stall increases the airplane will eventually begin to drop. If, as a result of the initiation of stall, the airplane experiences a pitch-up moment, causing the angle of attack to increase even further, the pilot will necessarily have to exert a positive downward control moment, viz, by pushing the control column forward, in order to prevent a worsening of the stall condition. On the other hand, if the natural tendency of the airplane at the initiation of stall is to experience a pitch-down moment, the plane will tend to recover from the stall without attention by the pilot. Pilot control of pitch attitude at stall is an important stall characteristic.

B11. Another aspect of stall which is of importance to the designer, as well as the pilot, is the effect of the stall on the roll behavior of the airplane, which brackets the pilot's ability to control the plane's roll behavior.

Stall initiation on a typical wing usually means that only a portion of the wing has stalled, that only a portion of the wing has lost its lift. Loss of lift on a portion of the wing results in a redistribution of the forces operating on the wing and the airplane. If the respective areas of separation on the right wing and the left wing are not symmetrical, there is an imbalance of the forces which results in a roll moment or roll behavior of the airplane. Changes in net lift on the wings become more significant the further outboard on the wings they occur because greater roll moments are created as the location of the force imbalance moves away from the longitudinal centerline of the airplane. For this reason, it is generally considered desirable to avoid a wing design which results in initiation of stall at or near the wing tip.

B12. The principal object of the patent in suit is to design and construct a wing shape which causes the initiation of stall to occur at or near the mid-semispan of the wing, and to spread inboardly more quickly than outboardly. This object and the patentee's solution are not new since the desirability and technique of avoiding tip stall were

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known and understood in the art long prior to the application date of the patent in suit.

B13. The maximum attainable section lift coefficient of an airfoil section, or its $C_{l_{max}}$, is a quality which was well appreciated in the art of aerodynamics prior to the date of the application which matured into the patent in suit. In theory, the lift coefficient of an airfoil section is directly proportional to the angle of attack of the section with respect to the oncoming airflow. As the angle of attack is increased, there is a proportional increase in the lift coefficient or lift capability of the airfoil section. As the angle of attack is continually increased, however, there will be no further corresponding increase in lift coefficient or lift capability. At this point, the section is said to have reached its maximum lift coefficient, or $C_{l_{max}}$. In fact, further increases in

angle of attack will result in decreases in lift capability. The physical phenomenon which begins to occur at the maximum lift coefficient is referred to as stall.

B14. The spanwise distribution of actually prevailing section lift coefficients, or C_l distribution, is also a term and quality well understood in the art of aerodynamics prior to the filing date of the application for the patent in suit. Theoretical approaches to determine the C_l distribution were advanced and published even before the Wright brothers' first flight.

B15. The relationship of the C_l and $C_{l_{max}}$ distributions set forth in the patent is reflected in Figure 2 of the patent, which is commonly referred to as a stall diagram.

B16. Stall diagrams, including the stall diagram of Figure 2 of the patent, and the methods for creating stall diagrams were well known in the prior art as early as the 1930's. For example, methods for creating stall diagrams were taught in NACA Technical Report 572 (Exhibit E, 1936). NACA Technical Report 703 (Exhibit I, 1940) and NACA Technical Note 713 (Exhibit J, 1939) were extensions of the work described in TR 572 and further showed the use of stall diagrams and the limitations in the theories underpinning such diagrams.

B17. The so-called envelope feature of Claim 2 declares a relationship between the $C_{l_{max}}$ and C_l distributions in the stall diagrams which relationship is, in fact, inherent in the creating of the stall diagram. In theory, the $C_{l_{max}}$ distribution always "envelopes" the C_l distribution because the the actually prevailing lift (lower curve in Figure 2 of the patent) at any given spanwise location can never exceed the maximum attainable lift (upper curve in Figure 2 of the patent) at the same spanwise location. Therefore, wherever the C_l at any point on the wing reaches its maximum as shown in

the $C_{l_{max}}$ distribution on the stall diagram, stall is said to initiate on the wing.

C. PRIOR ART KNOWN TO DR.GARBELL WHEN THE APPLICATION FOR PATENT WAS FILED.

C1. The patent application sought to utilize airfoil section data in a wing which, broadly speaking, was defined by three airfoil sections, one located at the root having the least mean line camber, one at the tip having the greatest camber, and an interjacent section having camber at variance with that obtained by straight-line fairing between root and tip. The wing was claimed to improve stall.

C2. At the trial Dr. Garbell conceded:

a) It was old in the art at the time of the alleged invention to use three or more controlled sections to define the exterior shape of an aircraft wing.

b) It was old in the art as of 1946 to select three or more (as many as eight) controlled airfoil sections to define the shape of a wing for aerodynamic purposes;

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c) It was old in the art to define the exterior shape of a wing using three or more controlled sections for the purpose of avoiding tip stall;

d) It was old in the art, prior to 1946, to obtain an increase in the $C_{l_{max}}$ of an airfoil section by increasing the camber of that same section for the purpose of avoiding tip stall;

e) It was old in the art to have a wing with the least camber at the root;

f) It was old in the art to have a wing with the greatest camber at the tip;

g) It was old in the art to compute the actually prevailing lift across the semispan in accordance with the teachings of the patent in suit;

h) It was old in the art to have an interjacent section that was different from the section obtainable by straight-line fairing between the root and tip sections:

i) It was old in the art to determine the spanwise distribution of maximum attainable section lift coefficients in accordance with the teachings of the patent in suit.

C3. In the early development of the art of aerodynamics and wing design, it was recognized that the airflow around three-dimensional bodies such as airplane wings is an extremely complicated phenomenon. Simplifying assumptions about the airflow were made so that some systematic theoretical research could be carried out.

C4. One of the first simplifying assumptions made was to substitute a two-dimensional airfoil section for the three-dimensional wing or fluid-foil surface. In the conception of the airfoil section, the section actually represents a cross-section profile or slice through a wing having the same section and dimensions throughout the span. The airfoil section, having only two dimensions, induces airflow in only two dimensions rather than in three dimensions.

C5. The concept of the airfoil section proved to be extremely useful for both theoretical and experimental research efforts. The aerodynamic properties of airfoil sections could be investigated in a "laboratory" setting, apart from how any given airfoil section might behave in an actual three-dimensional airplane wing. During the 1920s a great many airfoil section shapes were investigated in this country as well as in Europe, but the most expansive work was begun by the National Advisory Committee on Aeronautics (NACA) in the late 1920s.

C6. In 1931, the NACA published Technical Report 383 by Dr. Theodore Theodorsen (Exhibit N). In this

report, Dr. Theodorsen described the thin wing theory, a refinement to the theory of airfoil sections. The thin wing theory applies to the component of flow associated with the relative curvature or mean line camber of the section.

C7. NACA's approach to research on the behavior of airfoil sections was to develop families of related airfoil sections, to determine certain properties of those sections. Such work was done by Prof. Robert M. Pinkerton around 1929.

C8. The NACA set about testing two-dimensional models of these sections in their wind tunnel facilities. In 1935, the NACA published Technical Report 460 (Exhibit A) which presents the results of the development and testing of the NACA's first series of related airfoil sections, called the NACA four-digit airfoils.

C9. Research continued, and a five-digit series of airfoil sections was developed, followed by the six-digit series of airfoil sections. For the most part, the airfoil development work was unclassified, and the NACA published hundreds of pages of data in the form of technical reports and technical notes which were distributed throughout the world prior to July 1945.

C10. The NACA's objective in developing its airfoil sections and in publishing data on those sections was to provide the aircraft industry and wing designer with basic data which would enable wing designers to make knowledge-

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able choices of airfoil sections for wing design. As evidence of the acceptance of the quality and quantity of the NACA's work, it is to be noted that Zien, writing his paper in Germany in 1938, used NACA airfoil sections in his example wing (Exhibit AP). Lachmann, writing for the Journal of the Royal Aeronautical Society in 1937, used NACA airfoil sections in his example (Exhibit AO). Zacher, in his article (Exhibit AJ) which describes the

development of the D-30 Cirrus Glider notes that NACA mean lines were designated for the root and tip sections of the D-30 Cirrus. Virtually all of Dr. Garbell's glider designs built in Italy in the 30's and all of Dr. Garbell's proposals and designs made while he was employed at CVAC featured NACA airfoil designations. It is undisputed, therefore, that the concept of the airfoil sections, the use and utility of airfoil sections and airfoil section data in wing design were commonly known and understood in the art well before the date of the application which matured into the patent in suit.

D. COVERAGE OF THE CLAIMS.

D1. Claim 1 of the patent in suit relates to a lifting surface defined solely by specifying the relative mean line camber values of the three or more controlled airfoil sections in the wing. The least mean line camber must be in the controlled section at the root, the greatest mean line camber must be in the controlled section at the tip, and the mean line camber values at one or more interjacent sections must be greater than which would be obtained at the same respective spanwise location of the interjacent sections by straight-line fairing between the root and tip airfoil sections.

D2. Claim 2 of the patent in suit also defines a wing solely in terms of the relative mean line camber values of the controlled fluid-foil sections making up the wing. However, Claim 2 contains further limitation that "... said three or more controlled fluid-foil sections having values of the mean line camber selected in such manner that the resulting spanwise distribution of maximum obtainable section lift coefficients of the three or more controlled sections forms a curvilinear polygon enveloping a curve representing the spanwise distribution of section lift coefficients for a given planform actually prevailing at the maximum attainable lift coefficient of the lifting surface".

There are three elements of the foregoing limitation; the spanwise distribution of maximum attainable section lift coefficients or $C_{l_{max}}$ distribution, the spanwise

distribution of actually prevailing section lift coefficients, the C_l distribution, and the envelopment feature.

D3. Claim 3 is essentially the same as Claim 2 with the addition of a further limitation, "... that the said resulting spanwise distribution of maximum attainable section lift coefficients for a given planform be so shaped that the first intersection with the spanwise distribution of actually prevailing section lift coefficients occurs in that interval of spanwise stations in which stall inception is to be obtained". This "tangency" limitation, describes where stall will occur on the wing based on the relationship between the $C_{l_{max}}$ and C_l distributions.

D4. Claim 7 relates to a lifting surface defined according to the same mean line camber relationship set forth in Claim 1 i.e., smallest, greater, greatest going from root to tip with the addition of a limitation as to the location of at least one interjacent section, i.e., where two lines drawn tangent to the lift distribution, C_l , intersect.

D5. Other claims in the patent cover variants where the mean line camber of the interjacent section is less than that obtained by straight line fairing.

D6. The patent issued on the continuation-in-part application 2,498,262, extended the patentee's coverage to wings

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in which the camber of the interjacent section exceeded that at the tip.

REDUCTION TO PRACTICE.

E1. Neither the patentee, Dr. Garbell, nor the plaintiffs ever actually reduced to practice the alleged invention covered by Claims 1, 2, 3 and 7 of the patent in suit;

E2. Neither of the defendants, McDonnell Douglas and Boeing, designed, developed, constructed or performed work of any kind on wings on for or on behalf of Dr. Garbell, and none of the wings employed in anywise by the defendants are or were reductions to practice of the invention of the patent in suit.

E3. Dr. Garbell was never an employee of, nor performed any work for, either of the defendants, McDonnell Douglas and Boeing.

E4. No one acting for or on behalf of Dr. Garbell ever actually reduced to practice the alleged invention covered by the claims of the patent in suit.

E5. The tangible embodiments of the wings, which Dr. Garbell testified he designed for the CVAC Two-Engine Tailless, the XB-46, the Model 107, the Model 110 and the other CVAC airplanes, Models 240, 340, 440 and 880 having wings allegedly covered by the patent claims, cannot be relied upon by Dr. Garbell as actual reductions to practice for or on behalf of Dr. Garbell.

E6. Dr. Garbell was paid by CVAC, as its employee, for such design and other work as he may have performed in connection with the wings above named.

E7. CVAC manufactured all the above wings either for its own purposes or for purposes of the Government.

E8. CVAC was not the agent of Dr. Garbell as to any of its operations, and, more specifically, was not Dr. Garbell's agent as respects any wings it may have constructed which embodied a camber distribution covered by any of the claims of the patent in suit.

E9. Dr. Garbell "constructively" reduced his invention to practice by the filing of the application of the patent in suit on July 16, 1946. The earliest date plaintiffs can rely upon as the date of invention is thus July 16, 1946 for purposes of applying Section 102.

F. ANTICIPATION - THE CURTISS-WRIGHT DEVELOPMENT.

F1. In a period from approximately 1935 to 1940, the Curtiss-Wright Company, St. Louis Division, built series of single-engine, low-wing monoplanes. The first of these airplanes was known as the Curtiss-Wright 19L. As originally built, the Model 19L had a constant camber wing, that is the camber at the root was the same as the camber at the tip with no variation between root and tip. During flight tests, this wing proved to have very poor stall qualities, with a tendency to stall near the wing tips causing dangerous roll behavior. Dr. Albert E. Lombard, Jr. of the Curtiss-Wright Company modified the 19L wing in order to improve its stall characteristics. The modifications were carried out by adding a "glove" to envelope the leading edge area of the 19L wing. The glove had the effect of increasing the camber of the wing near the tip with the increase in camber diminishing proportionately in moving inboard from the wing tip to the Rib 4 station. In addition to increasing the camber, the glove had the effect of increasing the leading edge radius of the wing.

F2. The modified version of the Curtiss-Wright Model 19L became known as the Model 19R. Flight tests showed that the Model 19R wing was a substantial improvement over the 19L wing in terms of stall performance. Dr. Lombard disclosed his work to the public in an article entitled "Technological Improvements in the Curtiss-Wright Coupe", published in the Journal of the Aeronautical Sciences, June, 1936 (Exhibit BC).

F3. Dr. Albert E. Lombard, Jr.'s article illustrates the fact that it was well-known in the art prior to the filing date of the application with matured into the patent in suit that an increase

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in camber of a given airfoil section could bring about an increase in the maximum lift coefficient of the airfoil section and that the use of a highly cambered section in the tip region of an aircraft wing would help prevent tip

in camber of a given airfoil section could bring about an increase in the maximum lift coefficient of the airfoil section and that the use of a highly cambered section in the tip region of an aircraft wing would help prevent tip stall; that is, that the airfoil sections near the tip would not reach their maximum lift coefficient (stall point) at the same time that sections further inboard would begin to stall. This fundamental principle, that an increase in camber tends to increase the maximum lift coefficient of an airfoil section, has also been taught in the earlier publications of the NACA, particularly in Technical Report 460 (Exhibit A). Dr. Lombard's paper received wide attention as evidenced by the fact that it was subsequently cited by Zien in 1938 (Exhibit AP), written and published in Germany. Dr. Lombard paper is also cited by Lachmann (Exhibit AO), published in the British Journal of the Royal Aeronautical Society in 1937.

F4. In 1938, the Curtiss-Wright Company undertook to design a fighter aircraft to be entered in a Government competition. The engineering decision was made to adopt the outer wing panel of the old Model 19R configuration for what would become the outer panel of the wing of the new Model 23 airplane. Up until the design of the Model 23 airplane, Curtiss-Wright had been building its single-engine monoplanes with fixed landing gear or partially retracted landing gear. In order to give the Model 23 greater performance, it was determined that the Model 23 would have flush retracting landing gear.

F5. The Model 23 wing was designed to give improved aerodynamic performance as to both lift and drag.

F6. The wings of the Curtiss-Wright Model 21B and the Model 23 have the same geometry and are formed of three controlled airfoil sections.

F7. The Court has adopted the findings of the Special Master with respect to the Curtiss-Wright Model 21B and Model 23 as set forth on Page 41 of Exhibit 1 as follows:

Airfoil	Mean line shape	Semi- span position	c_{li}	Max. rise	Chordwise location of max. rise
Rib 1	Ex. IH-10A 246 and R.970	0.0%	.00	0.0%	-
Rib 4	Ex. KE-1	26.5%	.27	1.9%	30%
Rib 11	Ex.KE	92.9%	.48 to .54	3.5%	30 to 40%
*Faired airfoil	Ex. KE-2	26.5%	.079 to .085	0.6%	30%

* Straight line faired between the Rib 1 and Rib 11 stations at the Rib 4 station.

F8. Rib 1 of the Curtiss-Wright Model 21B and Model 23 airplane wings is the controlled fluid foil section located at the root.

F9. Rib 4 of the Curtiss-Wright Model 21B and Model 23 airplane wings is the interjacent controlled fluid foil section.

F10. Rib 11 of the Curtiss-Wright Model 21B and Model 23 airplane wings is the controlled fluid foil section located at the fluid-dynamically effective tip.

F11. The Curtiss-Wright Model 21B and Model 23 wings were thus characterized by a camber distribution as called for by Claims 1, 2, 3 and 7 of the patent in suit in which the controlled airfoil section located at the root had the least mean line camber, the controlled airfoil section located at the tip had the greatest mean line camber, and in which the interjacent controlled airfoil section had a mean line camber at variance with, and greater than, the

mean line camber of the airfoil section obtainable at the same interjacent spanwise station by means of straight-line fairing between the airfoil section at the root and the airfoil section at the tip of the wing.

F12. Plaintiffs' own evidence supports precisely that wing geometry which defendants sought to prove and which the Special Master found for the Model 21B and Model 23 wings and shows the improvements in lift obtained by this wing over the previous wing used on the Model 19R.

F13. Stall analysis of the Curtiss-Wright Model 21B and Model 23 wing design (Exhibit IP) shows that the spanwise distribution of maximum attainable section lift coefficients of the three controlled sections forms the equivalent of a "curvilinear polygon" which envelopes the curve of the spanwise distribution of actually prevailing section lift coefficients near the maximum attainable lift coefficient of the lifting surface, as covered by Claims 2 and 3 of the patent in suit.

F14. The stall analysis for the Curtiss-Wright Model 21B and Model 23 wing design (Exhibit IP) shows that the first intersection of the curves of the maximum attainable and actually prevailing lift coefficients occurs in the vicinity of mid-semispan in accordance with the objectives of the patent in suit.

F15. The stall analysis for the Curtiss-Wright Model 21B and Model 23 wing design (Exhibit IP) shows that the wing design substantially achieves the object of the patent in suit in avoiding tip stall and in creating mid-semispan stall which spreads more rapidly inboard than outboard.

F16. Analysis of the design of the Curtiss-Wright Model 21B and Model 23 wing design (Exhibit IP-1) shows that the interjacent fluid foil section is located near a spanwise point corresponding to the intersection of a tangent to the inboard portion of the curve of actually prevailing section lift coefficient and a substantially horizontal tangent to the highest point of the same curve as covered by Claim 7 of the patent in suit.

F17. The Curtiss-Wright Model 21B and Model 23 wings embodied the same combination of elements as claimed in Claims 1, 2, 3 and 7. The Curtiss-Wright Model 21B and Model 23 wings performed the same functions and achieved the same objectives sought by the patent in suit.

F18. Flight tests of the Curtiss-Wright Model 21B and 23 airplanes showed that each of the respective airplanes had highly satisfactory stall characteristics.

F19. The Curtiss-Wright Model 23 airplane was built and offered for sale in the United States to the United States Government in 1939.

F20. The Curtiss-Wright Model 21B was manufactured and placed on sale in the United States in 1940.

F21. Aircraft of the Fighting Powers (Exhibit PK) states the following with reference to the Curtiss-Wright Model 21B:

"The 21B was built solely for export and had never seen service on any battlefield when accepted by the Dutch. Nevertheless, when action was joined with the Japanese in the spring of 1942 the CW 21B proved to be the best fighter in service with the Netherlands East Indies and gave a fine account of itself. Its top speed was higher than that of either the Mohawks or the Buffaloes, and the climb was simply phenomenal."

F22. The Army Air Force evaluation of the Curtiss-Wright Model 21B (Exhibit BM-6) states:

"Performance of the Curtiss-Wright CW-21B compares quite favorably with that of the Japanese Zero".

F23. The Curtiss-Wright Model 21B and Model 23 wing shape was utilized in

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later proposals, e.g. P-248 (Ex. JX-19); developed by Curtiss-Wright for new fighter aircraft.

G. ANTICIPATION AND OBVIOUSNESS - ZIEN,
LACHMANN, LOMBARD, NACA and ZACHER.

G1. The essence of the alleged invention had been published and was widely known more than one year prior to the application for the patent in suit.

G2. An article by Zien published in Germany in 1938 (Exhibits AP and AP-1), described the use of a non-straight-line faired camber distribution in a wing for the dual purpose of reducing the wing induced drag and for bringing about safe stall characteristics.

G3. On the basis of the teachings of the Zien article, and the example wing given by Zien, it would be obvious to persons of ordinary skill in the art at the time of the alleged invention to choose non-straight-line faired camber distributions on which the claims in suit of the subsequent Garbell patent would read with the specific purpose of improving the stall characteristics of airplane wings and for preventing tip stall on airplane wings.

G4. The Zien paper shows an example wing having five controlled airfoil sections, one section being at the root, another section at the tip and three interjacent sections in which each of the three interjacent sections has a mean line camber greater than (and "at variance with") that which would be obtainable at the respective spanwise stations of the interjacent sections by straight-line fairing between the the root and tip sections. The Zien example differs from a wing covered by a literal reading of Claims 1, 2, 3 and 7 of the patent in suit only to the extent that the camber of the outermost interjacent section is equal to the camber of the tip section (i.e., a "constant camber outer panel").

G5. Although the specific example given by Zien has a constant camber outer panel which, according to a strict reading of the claims of the patent, would not be covered by the claims in suit, it is recognized that the example is nothing more than an illustration of the method of wing design proposed by Zien. Zien proposed

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the use of non-straight-line faired camber distribution for the specific purpose, among others, of improving the stall characteristics as compared to a wing defined only by sections at the root and tip. It is concluded, therefore, that the subject matter of the patent is equivalent to the methodology taught by Zien in means, function, and result. Persons of ordinary skill in the art would recognize that the specific example offered by Zien does not represent the only camber distribution which would accomplish the objectives of the Zien methodology, and that Zien teaches, in substance, that many different types of camber distributions, including those covered by Claims 1, 2, 3 and 7 of the patent in suit, may be useful to accomplish those objectives.

G6. The Zien wing differs from the wing called for by a literal reading of Claims 1, 2, 3 and 7 of the patent in suit in that one of its interjacent sections, the outermost section has a mean line camber equal to the mean line camber of the tip section. It is apparent that if the tip section were removed, the Zien wing would have the precise camber relationship called out by Claims 1, 2, 3 and 7 of the patent in suit, and would be a workable wing.

G7. There would be no critical difference between the stall performance of the Zien example wing and a wing having the precise camber relationship called out by Claims 1, 2, 3 and 7 of the patent in suit.

G8. The Lachmann article published in 1937 (Exhibit O), taught the utility of non-straight-line faired camber distributions for the purpose of improving stall characteristics of wing designs. Lachmann teaches a distribution of cam-

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ber along the semispan of a wing to avoid tip stall.

G9. Lachmann disclosed an example wing in which the root section had the least mean line camber and the interjacent section had a camber equal to the camber of

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the tip section, the camber of both interjacent and tip sections are greater than that of the root section.

G10. There is no critical difference between the geometry of the example wing given by Lachmann and the geometry of the wings covered by Claims 1, 2, 3 and 7 of the patent in suit.

G11. Camber distribution covered by Claims 1, 2, 3 and 7 of the patent in suit is created from the Lachmann example with a slight decrease in the camber of the interjacent section.

G12. Lachmann taught that, in general, improvements in stall characteristics of tapered wings could be accomplished by using non-straight-line faired camber distributions. The specific example given by Lachmann, although not precisely covered by the claims of the patent in suit due to the constant camber outer panel of the Lachmann wing, nevertheless was demonstrated analytically to have satisfactory stall characteristics.

G13. In view of the teachings of the Lachmann article, the subject matter of the patent in suit would have been obvious to those of ordinary skill in the art at the time of the alleged invention and long prior to the filing date of the patent.

G14. It is concluded that the subject matter of the patent in suit is equivalent to the methodology taught by Lachmann in means, function and result.

G15. Dr. Garbell, while an employee of CVAC, prepared Aero Memo #604 dated March 2, 1945, (Exhibit KK) which proposed to CVAC the use of an alternate wing to correct the unfavorable stalling characteristics of the wing of the XB-36 airplane.

G16. Aero Memo #604 (Exhibit KK) contains the statement, "The 'tri-section wing' principle which has been successfully applied to the Tailless design, the executive transport, and the XB-46 design, yields several satisfactory wings."

G17. Aero Memo #604 specifically suggested for use as an alternate wing Proposal #6 (preferred) and Proposal #2 (second choice) which Dr. Garbell characterized as "the two most promising proposals".

G18. The suggested wings of both Proposal #6 and Proposal #2 consist of three controlled airfoil sections having a camber distribution where the root has the least camber, the tip has greater camber and the value of the interjacent section has a camber which is equal to the value of the camber of the tip section. Proposal #6 and Proposal #2 are, accordingly, wings with a constant camber outer panel, just as disclosed by Zien in 1938 and Lachmann in 1937.

G19. District Court Judge Leon R. Yankwich in the CVAC case characterized Aero Memo #604 as the "fullest disclosure of the patent invention" which is the subject of Patent No. 2,441,758, and plaintiffs adhere to that statement in this action. 94 F.Supp. 843 at 845 (S.D. Cal.1950).

G20. The patent specification also teaches the use of camber at the interjacent section equal to that of the tip as disclosed in Aero Memo #604 (Exhibit KK). Further evidence of the pertinence of such wings is Dr. Garbell's deposition (Exhibit HT) testimony as to his basis for filing this action against Boeing. In Exhibit HT, page 86, lines 8-18, Dr. Garbell states, "I had visual evidence and comments of a seasoned airline pilot concerning the excellent stalling characteristics and the confidence of this pilot in his Boeing 707 in my very first flight on the airplane. These excellent stalling characteristics do not just happen by accident in a highly tapered and swept-back wing such as

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that of the 707. I mean of the general outline of the 707 wing. On the close inspection that I had in the course of that flight, and along stop over, long, 45 minutes to an hour, I was unable to see any external indications of any device, anything different from the design geometry of

my invention". Dr. Garbell later acknowledged that that particular 707 had a constant camber outer panel as disclosed by Zien in 1938.

G21. Lachmann's camber distribution, Figure 12A of Exhibit AO, using the language of Claim 1 of the patent in suit where applicable is as follows:

"A lifting surface with three controlled fluid-foil sections, in which the first section with the smallest mean line camber is located at the root, the second section with a greater mean line camber is located at the fluid-dynamically effective tip, and the third fluid-foil section is located at a station interjacent between the root and tip wherein the value of the mean line camber of the interjacent section, being identical to the value of the mean line camber of the tip section, is greater than the value of respective interjacent station obtainable by means of straight-line fairing between the section located at the root and the section located at the tip".

By combining an infinitesimal amount of the Lombard approach (Exhibit BC) to the Lachmann approach (Exhibit AO, Figure 12A), the word "greater" used above in characterizing the mean line camber of the tip section becomes "greatest", and Claim 1 of the patent in suit exactly characterizes the combined Lachmann-Lombard configuration.

G22. By combining an infinitesimal amount of the Lombard approach (Exhibit BC) to the Zien approach (Exhibit AP), the word "greater" used above in characterizing the mean line camber of the tip section becomes "greatest", and Claim 1 of the patent in suit exactly characterizes the combined Lachmann-Zien configuration.

G23. To aerodynamicists working prior to the time Dr. Garbell conceived his invention, it would be obvious to try such combination.

G24. In 1940, the NACA published a Report No. 703 entitled "Design Charts Relating to the Stalling of

Tapered Wings" (Exhibit I). The report described the effects of increasing camber at the tip and presented charts showing the "envelopment" and "tangency" limitations in Claims 2 and 3 and the lift distribution as called for by Claims 2, 3 and 7.

G25. The subject matter covered by Claims 1, 2, 3 and 7 would be obvious to one skilled in the art prior to the time Dr. Garbell conceived his invention when the Lachmann or Zien references are considered in combination with NACA Report 703.

G26. The subject matter of the patent in suit would be obvious to persons skilled in the art prior to the time Dr. Garbell conceived his invention when NACA Report No. 703 is considered.

G27. The Zacher article (Exhibits AJ and AJ-1), describes a wing having a camber distribution which is covered by Claims 1, 2, 3 and 7 of the patent in suit.

G28. In the Zacher article, the camber distribution of the wing is given in terms of the distribution of the angles of zero lift of the airfoil sections making up the wing. The angle of zero lift of an airfoil section is mathematically related to the camber of the section to the same extent, and with the same limitation, as the c_{l_i} or ideal lift coefficient is related mathematically to the camber of an airfoil section.

G29. The distribution of the angles of zero lift of the wing described in the Zacher article is shown by the Epsilon sub W curve in Bild 5 of Exhibit AJ. The Epsilon sub W curve shown in

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Zacher is similar to the angle of zero lift curves derived by Dr. Garbell for the airplanes he designed while at CVAC and which airplanes, as Dr. Garbell testified, had the camber distributions of Claims 1, 2, 3 and 7 of the patent in suit.

Zacher is similar to the angle of zero lift curves derived by Dr. Garbell for the airplanes he designed while at CVAC and which airplanes, as Dr. Garbell testified, had the camber distributions of Claims 1, 2, 3 and 7 of the patent in suit.

G30. A person of ordinary skill in the art at the time of the alleged invention, viewing Bild 5 of the Zacher article, and the description of the wing contained in the Zacher article, could reasonably surmise that the camber distribution of the wing described is that covered by Claims 1, 2, 3 and 7 of the patent in suit.

G31. The Zacher article was printed and published in Germany in 1944.

G32. Bild 5 and the specifications for the wing set forth in the Zacher article render the subject matter of the patent in suit obvious to those skilled in the art prior to the time of the alleged invention.

G33. A comparison of the patent with the prior art as a whole is accurately characterized by Professor Pinkerton: "I can't read anything in the patent beyond what we knew and practiced in the '30s".

G34. The level of skill in the airframe industry is extraordinary. For example, the men who appeared in court who were active in 1945 are men of considerable ability and accomplishment. Ira H. Abbott became Director of Research for NASA and responsible for the X-15 design. Orville Dunn became head of aerodynamics for Douglas, responsible for the aerodynamic design of the DC-10. William T. Hamilton designed the B-52 wing and became Director of Technology on Boeing's SST. Wesley T. Butterworth was at North American Aviation on the Appollo Program. Prof. Robert Pinkerton became a full professor at North Carolina State University. Dr. Albert E. Lombard, Jr., became Vice President, Director of Research for McDonnell Douglas. Al Riedler was not out of school in 1945, but practically upon his graduation assumed design responsibility for the Convair 880 and 990 jet transports. Dr. Garbell also verified the high level of skill found in airframe industry engineers.

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Footnote 10.

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G36. The Cronstedt patent, without setting out guidelines, shows the use of a third or interjacent section which could have a camber at variance with the camber obtained by straightline fairing between the tip and root sections.

G37. The Cronstedt patent rendered the subject matter of the patent in suit obvious to persons of ordinary skill in the art prior to the time Dr. Garbell conceived his invention.¹¹

G38. The Crostedt patent and other referenced patents are not as pertinent as various prior art publications presented at this trial.

H. THE PATENTED COMBINATIONS ACHIEVE NO NEW RESULT.

H1. It was conceded by Dr. Garbell that there are numerous examples of wings and wing designs in the prior art in which the camber of the tip section is greater than the camber of the root section and in which there is straight-line fairing between root and tip sections. Lombard taught (Exhibit BC) that such two-section wings could be made to achieve satisfactory stall characteristics.

H2. Claims 1, 2, 3 and 7 of the patent in suit differ from the Lombard

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(Exhibit BC) wing only to the extent that a third section (or more) is introduced to have a camber "at variance with" the camber which would be obtained at the same

spanwise location by straight-line fairing between the root and tip sections. No new, surprising, or synergistic result, in terms of stall performance, can be achieved over the prior art two-section wing either by increasing the camber of an interjacent section or by decreasing the camber of an interjacent section.

H3. During the course of a very extensive study of stall conducted by Boeing in 1941, Boeing achieved stall comparable in all respects to that sought by the patentee and illustrated in Fig. 3 for highly tapered (5:1) wings using a constant section wing across the span.

H4. Highly swept back or tapered wings which the plaintiffs do not claim to be infringements such as the Boeing B47, certain Boeing 707's, and certain Douglas transports such as the DC-4 and DC-6 have prior art configurations and have excellent stalling characteristics.

H5. Wings covered by the claims of the subject patent do not achieve new, surprising, or synergistic results in terms of accomplishing a combination of safe stalling characteristics, relatively low drag, and relatively high maximum lift.

H6. The Pinguino and Arcore sailplanes were designed with the help of Dr. Garbell (or by Garbell and Preti) and were flown in Italy in 1938. Each sailplane had more than two defining airfoil sections in its wing design.

H7. The camber distribution of the Pinguino sailplane would be covered by one or more of the claims of Garbell's second patent, United States Patent No. 2,498,262, which is a continuation, in part, of the patent in suit. This second patent was filed September 16, 1946, and issued February 21, 1950. Dr. Garbell acknowledged that the second patent achieved the same functional objects as the first patent.

H8. The combined coverage of the first and second patents would include the camber variations in every

wing design of three or more controlled airfoil sections in which the camber of the tip section is greater than the camber of the root section and the cambers of the interjacent sections are greater than that of the root.

H9. At Column 10, lines 50 et seq. of the patent in suit the statement appears, "Numerous flight tests and wing tunnel tests in reputable wind tunnels such as the California Institute of Technology, the Massachusetts Institute of Technology, the various wind tunnels of the National Advisory Committee for Aeronautics, and elsewhere have demonstrated convincingly that each of the objects of this invention has been fully achieved. The tests were performed on numerous wing models, on sailplanes, and on models of at least five aircraft designs of widely varying design scope employing a wide variety of airfoil series." The "flight tests" referred to were tests only of sailplanes and the Pinguino sailplane was one of the references intended to be included by the use of the term "sailplanes".

H10. Dr. Garbell acknowledged that at the time of filing of the patent in suit he was aware that the Pinguino and Arcore sailplane were fully described in printed publications in Europe during the late 1930s.

H11. Dr. Garbell conceded that the Pinguino camber distribution was covered by Claim 3 of the second patent application as filed (the '262 patent). The figures and diagrams of the second patent (Exhibit AV) are substantially identical to the figures of the first patent (Exhibit AU). Dr. Garbell conceded that he relied on the same tests of the Pinguino sailplane to demonstrate the operability of the subject matter of the second patent as he did for the first patent.

H12. Based on the fact that the camber distribution of the Pinguino sailplane is not covered by any of the claims of the patent in suit, and upon the add-

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ditional fact that the Pinguino sailplane had fine stalling

characteristics to which Dr. Garbell attested, it is the finding of this Court that camber distributions covered by the claims of the patent in suit would produce no new, surprising, or synergistic result in terms of stall performance over the stall performance of the prior art Pinguino and Arcore sailplanes.

H13. It is found that the patent in suit does not teach a wing construction that has a special stall characteristics.

H14. It is the finding of this Court that the teachings of the patent in suit did not solve any stall problem long existing in aircraft wing construction.

H15. It is the finding of this Court that there is no novelty or invention in the teaching of this patent of a wing having at least three sections, a root section, an interjacent section, and a tip section having a mean line camber relationship where the mean line camber is the least at the root section, the greatest at the fluid-dynamically effective tip section, and has a greater mean line camber at the interjacent section than obtainable by straight line fairing from the root section to the tip section.

H16. The patent in suit is based upon old and well-known principles in the art of aircraft wing design.

H17. The prior art fully discloses knowledge of, use of, and development of aerodynamic lifting surfaces which operated upon the principle and produced the result of the wing described and claimed in Claims 1, 2, 3 and 7 of this patent.

I. STATUTORY BAR - ON SALE, PRIOR KNOWLEDGE AND PRIOR PUBLICATION

11. Dr. Garbell was employed by Consolidated Vultee Aircraft Company (CVAC) from September, 1942 until about October, 1945.

12. During his employment at Consolidated Vultee Aircraft Company (CVAC), Dr. Garbell worked intensively on the XB-46 project between May and September, 1945.

13. Dr. Garbell testified that during his employment at CVAC, it was he who proposed the wing design for the Two-Engine Tailless, the Model 107, the Model 110 and the XB-46. Dr. Garbell acknowledged that the purpose of his selection of the airfoil sections for the Tailless, the Model 107, the Model 110 and the XB-46 was to avoid stall problems. The airfoil sections used in these wings were NACA sections or slightly modified NACA sections.

14. In May of 1945, Dr. Garbell visited the Ames Laboratory of the NACA, where he met and talked with William T. Hamilton, then with the NACA, concerning the XB-46 wind tunnel testing in progress at the NACA Ames Laboratory.

15. Dr. Garbell acknowledged that prior to May of 1945 he proposed the shape of the XB-46 wing, was in charge of the aerodynamic design of the XB-46 wing, that he wrote the proposal submitted to the Government on the aircraft and that his design was carried out in the production of the wind tunnel model. He also testified that no change was made to the wing shape described in the specification submitted to the Government incorporated in the model or full-scale aircraft. The wing of the actual XB-46 airplane corresponds to the wing of the model. Dr. Garbell's wing configuration employed in the model and in the XB-46 airplane is covered by Claims 1, 2, 3 and 7 of the patent in suit.

16. The specification and aerodynamic data for the XB-46 and the wing tunnel model of the XB-46 was delivered by CVAC to the custody of the United States Government and title passed prior to July 16, 1945. Payments were made to CVAC on the contract (Exhibit GT-1) which included the purchase of said wind tunnel model and the data. The amount of money paid for the wind tunnel model alone was \$94,000.00.

17. Correspondence from the United States Government (Exhibit BO) to various airplane manufacturers, for the period of April and May of 1945, shows

that the Government required that all classified data on high-speed military jet aircraft such as the XB-46 should be exchanged among airplane manufacturers.

18. There was no seller imposed secrecy on the XB-46 specifications, data or wind tunnel model.

19. The use and sale of the model do not come within the "experimental" exception to 35 U.S.C. sec.102.

110. An XB-46 wind tunnel model wing, covered by Claims 1, 2, 3 and 7, was on sale to the United States Government more than one year prior to the filing date of the application which matured into the patent in suit.

111. During the course of his employment, Dr. Garbell worked on the design of a two-Engine tailless aircraft. Dr. Garbell knew that the tailless aircraft embodying his wing design had been offered for sale to the Navy prior to May of 1944. He was responsible for the report on the design (Convair Report ZA-101, Exhibit DW) distributed to the Navy in the period of April and May of 1944, and he went by himself to meet with Captain Diehl of the Bureau of Aeronautics in an attempt to sell the airplane to the Navy.

112. The invention was thus on sale more than one year before the date of application for patent.

113. In May of 1944, Dr. Garbell also discussed the two-engine tailless wing design described in Report ZA-101 with Ira H. Abbott of the NACA. Dr. Garbell testified that the airfoil sections of the wing shown in the report and that he discussed with Mr. Abbott and Captain Diehl were as described by Claims 1, 2, 3 and 7 in the patent in suit.

114. The patentee disclosed the tailless report without imposing any restrictions on his disclosure, to Mr. Ira H. Abbott more than two years prior to the date

of the application which matured into the patent in suit and the wing information including airfoils were distributed by NACA to various of its research facilities.

115. Such knowledge of the invention is public knowledge within the meaning of 35 U.S.C. Sec. 102.

116. After the disclosure made to Mr. Abbott by Dr. Garbell, Mr. Abbott suggested using a three section wing to cure the tip stall problem on the XB 36 being built by Convair at Fort Worth. A wind tunnel model of a wing similar to that suggested by Mr. Abbott was built and tested by NACA and a description of the model and the test results were described in an NACA printed publication distributed and available to military aircraft designers by April 1945 (Exhibit KF).

117. The wing described in the publication is covered by claim 11 of the patent in suit. The claims in suit, claims 1, 2, 3 and 7 are not patentable over claim 11 and so the inventions covered by Claims 1, 2, 3 and 7 were described in a printed publication before July 15, 1945.

118. Dr. Garbell, while in the employ of CVAC, prepared a paper entitled "Effective Control of Stalling Characteristics of Highly Tapered and Sweptback Wings", dated December 5, 1944 (Exhibit PD).

119. The paper was transmitted to the Institute of Aeronautical Sciences (IAS) on or about December 18, 1944, by Mr. T.P.Hall of the CVAC Aerodynamics Department.

120. The paper was transmitted to the IAS with Dr. Garbell's approval and intent that the paper be reviewed by the IAS for possible presentation during a January, 1945 IAS meeting.

121. On or about December 19, 1944, the patentee, Dr. Garbell, submitted a copy of this same paper to CVAC as an official disclosure of his invention. The disclosure made in this paper matured into the patent in this suit.

I22. The disclosure was reviewed by the IAS Editorial Board which included college professors and engineers in the airplane industry and also was reviewed by the United States War Department. The IAS informed Dr. Garbell that it in-

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tended to distribute copies of the paper to company libraries and the government departments where they will be available for reference. The IAS also informed Dr. Garbell that the War Department had stated that it had no objection to presentation or publication of the paper.

I23. The disclosure to the IAS was made without any restrictions imposed by Dr. Garbell, or by CVAC; neither Dr. Garbell nor other employees of CVAC made any attempt to stop the IAS from considering publication of Dr. Garbell's disclosure.

I24. By virtue of the disclosure to the IAS, and its Editorial Board, the disclosure was distributed to a great many people more than one year prior to the date of the application which matured into the patent in suit.

I25. The disclosure constitutes a printed publication within the meaning of section 102.

J. THE PATENT IS INDEFINITE.

J1. The patent in suit is fatally indefinite because it fails to comply with the statutory requirement that the applicant shall particularly point out and distinctly claim his invention. The exterior shape of a wing establishes its aerodynamic characteristics. The specification discusses the methods of analysis enabling one to arrive at wing exterior shapes which incorporate the teachings of the patent in suit and gives concrete examples of two wing exterior shapes which the patentee considers practical embodiments of his invention. The claims of the patent in suit, however, do not define the exterior shapes of wings.

J2. Claims 1, 2, 3 and 7 define all the airfoil sections only in terms of the relative values of camber. In addition, Claims 2 and 3 include a functional limitation that either the cambers of the airfoil are "selected in such manner that" when their "maximum attainable lift coefficients" are plotted, a certain type of curve, such as Figure 2, results. Claims 2 and 3 are called herein, "diagram claims".

J3. Mean line camber is an indication of the curvature of the "mean line" of an airfoil. The mean line is a purely imaginary line in a real wing, although it can be a real line on a drawing. Camber can be thought of as merely the deviation of a curve from a straight line, or as plaintiffs prefer, measured by a term called c_{l_i} , ideal

lift coefficient. In either case an infinite number of mean lines can have the same value of camber. Two curves can have the same value of geometric camber, but different values of c_{l_i} , and vice versa. Furthermore,

around any given mean line, an infinite number of airfoil sections can be constructed. Therefore, no matter how precisely and definitely one specifies the camber of a mean line (excepting a straight line) it can have an infinity of shapes, and around each one of these mean line can be constructed an infinity of airfoil sections. The definition of a mean line thus tells one almost nothing about the shape of the airfoil section. That the variety of possible shapes will necessarily a variety of aerodynamic characteristics is obvious and elementary. Thus, even if these claims specified with great particularity the cambers of the root, tip and interjacent sections, which they do not, an infinite variety of airfoil sections at each of these locations could result. The number of shapes covered by each of Claims 1, 2, 3 and 7 approaches infinity to the third power (infinity³).

J4. There is nothing in Claims 1, 2, 3 and 7 that defines any relationship among these sections, except camber. One might be blunt and full nosed, and thick in its forward portion; another, sharp at its leading edge

and have its maximum thickness well aft, while the third could have any other configuration. How all these might cooperate in the complete wing is anyone's guess. Certainly, there is no assurance that such a wing would operate to produce the results sought by the patentee. In this connection, the patentee, in his specification and examples, contemplated

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that he would use a "series" of related airfoils, such as the NACA "64-" series of his first example, throughout his example wing. However, there is absolutely nothing in these claims imposing any such limitation. In summary, then, these claims utterly fail to even approximately define the shape of a wing, and the shape is the only thing that matters.

J5. Claims 2 and 3, in effect, incorporate the diagrams of the patent, such as Figure 2. Figure 2, for example, purports to show values, by curve 6, of the "spanwise distribution of the actually prevailing section lift coefficients" (Col. 5, lines 1 and 2) and by curves 9, 11 and 8, the "spanwise distribution of maximum attainable section lift coefficients" (Col. 5, lines 14 and 15). "Actually prevailing" means just that. The only way to ascertain the "actually prevailing" values on high speed jet wings is by test. So, to establish the "actually prevailing" values on a swept wing to determine infringement, would require, at the very minimum, model tests and flight tests of some complexity. Similarly, the data required to draw the enveloping "curvilinear polygon" for a highly swept wing requires tests,

J6. The patentee does not show how to predict the behavior of highly swept-back wings of high speed jets which were unconventional in 1946. The patentee did not, and presumably could not, explain how to arrive at either the diagrams or the wing itself in the case of a highly swept wing having airfoil sections not related to one another. Thus, the public, in order to determine whether or not a proposed construction would come within the terms of the claims, would be required to

conduct extensive testing.

J7. The "diagram" claims, Claims 2 and 3, have another fatal defect: they include the functional statement "selected in such manner that . . ." at the very point of novelty.

J8. In applying Claims 2, 3 and 7 to a swept wing, the designer must know the effects of the following: fuselage (the biggest nacelle of all), pylons, nacelles, surface waviness, flap tracks, roughness, cracks, badly-worked rivet joints, and doors that haven't closed. The patent does not teach the effects of these influences on the swept wing. The only way to measure these influences would be by actual measurement of pressure on the full-scale airplane in flight.

J9. The definition of a "lifting surface" in the claims is indefinite and inadequate.

J10. The term "mean line camber" in the claims is an inadequate description of a controlled fluid-foil section.

J11. The term "mean line camber" in the claims provides an inadequate definition of the exterior shape of a wing.

J12. The term "mean line camber", as used in the claims of the patent in suit, is susceptible of more than one definition.

J13. "Mean line camber" in its literal sense is simply a property of the mean camber line or "thin wing". In the early NACA work, the camber of a mean line was expressed as the maximum rise of the mean line above the chord of the mean line (NACA Report TR 460, Exhibit A), the chord being a line connecting the leading and trailing edges of the mean line. More recently, the term "ideal lift coefficient" or c_{l_i} has been used as an

indication of mean line camber. The ideal lift coefficient is a mathematically derived characteristic of the shape of a given mean line based on the principles of the thin wing theory as given in NACA TR 383 (Exhibit N).

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J14. Other parameters can be used to characterize mean line camber, such as the angle of zero lift.

J15. None of the foregoing parameters of camber, viz, maximum rise, c_{1i} , angle of zero lift, is, by itself, properly descriptive of a shape of a mean line. For example, Dr. Garbell conceded that given a value of 0.3 for c_{1i} , a million mean line shapes would be encompassed.

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J16. The claims do not distinctly point out and claim the invention. The claims are not limited to the use of any particular parameter for measuring mean line camber. It is possible to have a single structure which would infringe if mean line camber is measured according to c_{1i} and not infringe if mean line camber is measured according to some other parameter such as maximum rise.

J17. The claims cover everything except those combinations which the patentee acknowledged were old. The claims are indefinite and the specification inadequate for the reason that there is no indication anywhere in the patent in suit as to the amount by which the camber of the interjacent sections should be less than that at the tip, or greater than the camber of the sections obtainable by straight-line fairing between root and tip. The patent thus does not teach one skilled in the art how to practice the invention.

J18. In the development of the Convair 880, approximately 57 different wing configurations were tested, all of which had camber distribution covered by Claims 1, 2, 3 and 7 of the patent in suit. The first wing exhibited totally unacceptable stall and even the 57th wing did not show good stall characteristics in the "clean wing" case, viz, without engine nacelles and pylons. CVAC was licensed under the patent in suit and so was free to use its teachings. Nevertheless, CVAC found extensive testing necessary. The wind tunnel test

program for the Convair 880 cost on the order of \$4 to \$5 million dollars.

J19. Boeing in designing the wing for its 707-320 series desired for economic reasons to use as much of the 707-120 series as it could. To arrive at a satisfactory wing for the 707-320, Boeing found that it required testing of about 40 wing models. During the latter stages of testing, the wind tunnel was used full time for two months.

J20. McDonnell Douglas began serious design efforts on the DC-10 project in about 1967, some four years after this lawsuit was filed. Judicial notice is taken of the fact that the patent in suit had expired in 1965 and of the fact that McDonnell Douglas would have been free to use the Garbell disclosure in the design of the DC-10. Twenty-six wing configurations were tested during the DC-10 development program. Total test time amounted to a figure somewhere between 10,000 and 15,000 wind tunnel hours, ranging in cost from \$1,200 per hour for low-speed wind tunnel tests and \$2,000 per hour for high-speed wind tunnel tests.

J21. The patent in suit did not, and cannot, obviate any of the expensive test work and cut and try design which goes into the development of the wing of a high-speed commercial jet transport.

J22. Extensive experimentation is still necessary for persons of ordinary skill in the art to design the optimum wing shape for a given aircraft.

J23. The Garbell patent assumes the existence of a mean line in every airfoil section. There are many possible definitions of mean line, but for the purposes of this litigation the NACA definition of a mean line is used. (See Court's Exhibit 1). The NACA definition of a mean line, as set forth in Exhibit 36-1 (page 65), states, in substance, that the mean line is the locus of points midway between the upper and lower surfaces of an airfoil section measured perpendicular to the mean line. The NACA definition poses no difficulty with regard to

standard NACA airfoil sections because those sections were constructed initially from mean lines, i.e., by superimposing symmetrical thickness distributions about given mean lines. However, the problem of ascertaining precisely a mean line in an airfoil section which has not been predefined with a mean line is extremely difficult.

J24. In the design of the accused DC-8 wing, Douglas aerodynamicists designed their own airfoil sections for specific application to the DC-8 wing.

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The Douglas airfoil sections, bearing "DSMA" designations, were designed without the use of mean lines. The Douglas aerodynamicists had advanced the art of airfoil design to the point where they were concerned only with the properties associated with the exterior surface of the airfoil section, and not with any theoretical properties of an imaginary mean line.

J25. In an attempt to prove that the DC-8 wing designs infringe the claims of the patent in suit, plaintiffs set about the task of trying to ascertain mean lines in the DSMA airfoil section for which no mean lines had been prescribed by Douglas. Prior to trial plaintiffs produced at least four sets of mean line camber values for the DSMA airfoil sections, summarized in Exhibit KQ. Dr. Garbell, in response to questions concerning the four sets of mean line camber values, admitted that one would find infringement or non-infringement depending upon the choice of individual mean line camber values from the four values for each airfoil section.

J26. The strongest evidence adduced as to the difficulty of ascertaining a mean line where one is not preselected is the fact that plaintiffs felt it necessary to engage the services of a computer programmer, Mr. Lynn Teuscher, to develop a computer program for finding mean lines in arbitrary airfoil sections. Dr. Garbell admitted that the computer program was unique and that plaintiffs had spent what they considered a monumental sum, approximately \$4,000, in developing the computer

program. Dr. Garbell also admitted that plaintiffs had sought a protective order to prevent defendants from using Mr. Teuscher's computer technique for finding mean lines.

J27. The Court notes the fact that there is no language in the patent which explains how one might go about the job of finding a mean line in an airfoil section which is not predefined with a mean line. It requires the exercise of extraordinary effort and experimentation to ascertain mean lines in non-NACA airfoil sections.

K. THE PATENT CLAIMS COVER INOPERABLE EMBODIMENTS.

K1. The claims of the patent in suit are overbroad in that they cover non-useful embodiments even for non-highly swept wings.

K2. The patent in suit teaches a dangerous stall pattern, as evidenced in Figure 2 of the patent.

K3. Figure 2 of the patent, and the language of the patent specification, teach the use of a "close envelopment" of the curve of actually prevailing section lift coefficients by the curve of maximum attainable section lift coefficients. Such a design invites simultaneous stall over a substantial portion of the wing semispan. It was known in the art at the time of the alleged invention that simultaneous stall over a large portion of the wing semispan should be avoided for the reason that one wing might stall slightly earlier than its opposite wing and result in a difficult and possibly uncontrollable roll behavior. As Zien observed, "The lateral controllability in the stalled flight attitude is bad" (Exhibit AP-1, p.14). NACA Technical Report 703 (Exhibit I) and NACA Technical Note No. 713 (Exhibit J) taught the use of a substantial margin between the $C_{l_{max}}$ and C_l curves

over the outer panel of a given wing in order to avoid the hazards of non-symmetrical stalling. The teachings of the foregoing NACA treatises prospectively refuted the Garbell teaching as to the quality of stall which should

be obtained.

K4. Professor Pinkerton, Mr. Abbott, Mr. Sivells, and Dr. Oswald, one of plaintiffs' witnesses, were unanimous in their opinions that the "close envelopment" teaching of the patent, as illustrated in Figure 2 of the patent, is a dangerous and impractical approach to stall control.

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K5. Mr. Abbott explained that the reason the NACA urged the use of a substantial margin between the $C_{l_{max}}$ and the C_l curves is that it is impossible, as a practical matter, to assure that the stall behavior of the right wing will be identical to the stall behavior of the left wing so that simultaneous and symmetrical stalling will occur. Atmospheric disturbances such as turbulence and buffeting are practical considerations which make it unreasonable to rely upon the exactitude of the stall diagrams. As Dr. Oswald put it, on cross-examination by defense counsel:

"(Question) Would you call the stall inception that you get based on that depiction, Figure 2, a good stall? Would that represent a good stalling wing?

(Answer) No, I would say this is not good. It seems to have stalled at almost all spanwise stations. If this would be used, one could expect that the unknown were greater than the differences shown here."

Mr. Orville Dunn, Director of Aerodynamics at the Long Beach, California facility of the defendant McDonnell Douglas Corporation, was even more emphatic in his mistrust of the type of stall recommended by the patentee:

"(Mr. Dunn) This shows a condition of stall inception in which the wing would appear to be stalling simultaneously at .7 (point 7) and in the region between .5 (point 5) and .11 (point 11) - in other words, a lot of this wing is going to stall at once.

(Answer) In the vernacular, that is a lousy wing."

K6. The patent methodology does not apply to highly swept-back wings such as the accused wings.

K7. The McDonnell Douglas DC-8 and DC-9 airplanes, the Boeing 707 airplanes and the General Dynamics Model 880 airplanes are representative of modern jet transports. These airplanes have wings that are highly swept-back and highly tapered as those terms are used in the patent.

K8. The methodology of the patent in suit depends substantially on the validity of two-dimensional flow principles.

K9. The outwardly directed spanwise boundary layer flow on a swept wing causes the airfoil sections near the tip of the swept wing to achieve much lower values of maximum lift capability than would be indicated for the same airfoil sections in the two-dimensional wind tunnel tests.

K10. The outwardly directed spanwise boundary layer flow phenomenon on a swept wing has the opposite effect on the airfoil sections near the root. They achieve far greater maximum lift capability than would be obtained for the same section in two-dimensional wind tunnel tests of those sections.

K11. Thus, the existence of three dimensional flow including an outwardly directed spanwise flow on swept wings makes the assumption of two-dimensional flow behavior meaningless in swept wing designs.

K12. This was demonstrated by Harper and Maki in their paper on the stall characteristics of highly swept wings, NASA TN D-2373 (1964; Exhibit HY-1). Mr. Abbott referred to Figures 11 and 12 of Exhibit HY-1 as illustrating the phenomena experienced on swept wings where sections near the tip do not attain the $C_{l_{max}}$ values one would expect from two-dimensional tests of those sections. Mr. William T. Hamilton offered the physical explanation that the spanwise flow phenomenon

on swept wings causes dead air or stagnant air to be transported to the outer wing panel, causing that portion of the swept wing to become more susceptible to stall. The type of camber distribution in a given highly swept wing has little or no effect on the tip-stall propensity of the swept wing because the spanwise boundary layer phenomenon far overshadows whatever beneficial effects can be gained from judicious camber selection.

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K13. The Convair 880 Jet Transport wing, which has a camber distribution covered by claims 1, 2, 3 and 7 of the patent showed marked tip stall in wind-tunnel tests without the presence of engine nacelles and pylons.

K14. In the development of the accused DC-8 swept wing jet airplanes, defendant Douglas Aircraft Company found it could not control or prevent tip stall by the selection of airfoil sections. Pylon mounted engines used on the DC-8 airplanes controlled the spanwise flow of the boundary layer air to force the inboard panel to stall first, which Douglas considered necessary for good stall characteristics.

K15. One of the principal indicators of tip stall on a swept wing is the pitch behavior of the wing at stall. On a swept wing, the tip lies much farther aft than the root. In order to achieve the proper alignment of lift forces with respect to the center of gravity of the airplane as a whole, the tip of a swept wing inevitably lies behind, or aft of, the center of gravity of the airplane. The loss of lift in the tip region (associated with tip stall) on a swept wing means there is less upward force behind the center of gravity of the airplane, the net effect being equivalent to an upward force on the nose of the airplane, i.e., forward of the center of gravity. Tip stall on a swept wing, therefore, produces a tendency for the airplane to pitch up at stall, an undesirable characteristic.

K16. Mr. Hamilton presented pitching moment data on certain of the Boeing swept wings (Exhibits SA and SB) studied in connection with Boeing's B-52 develop-

ment. All of them, including those with camber covered by Claims 1, 2, 3 and 7 showed pitch-up moments for the wing-body alone configuration, indicating tip stall. Mr. Hamilton also indicated that all of the swept wing designs with which he had been associated at Boeing, including the B-52, the 707, and several others, had demonstrated the same type of pitch behavior, a strong tendency to pitch up at the stall in the clean-wing configuration. However, the complete airplanes, including engine nacelles and pylons, and tail assemblies, showed either no pitch up at the stall, or some favorable pitch down at the stall.

K17. Among the highly swept-back jet airplanes that have been manufactured by defendant Boeing are bombers, the B-47 with 35 degree swept wings, the B-52 with 35 degree swept wings, and commercial airplanes, the 707 with 35 degree swept wings, the 727 with about 40 degree swept wings. Boeing remedied the effects of tip stall on these airplanes by means other than the use of camber distribution.

K18. Mr. Riedler, formerly of Convair, Mr. Dunn of Douglas and Mr. Hamilton of Boeing were unanimous in the view that the safe stalling characteristics of their respective commercial jet wing design were directly attributable to horizontal tail design and to the presence of external wing appendages, such as engine nacelles and pylons, which act in such a manner as to produce a vortex over the wing which breaks up, or mitigates the spanwise boundary layer flow on the swept wing, and to the presence of tail assemblies.

K19. The principle or mode of operation of the patent in suit, viz, the use of a non-straight-line faired camber distribution across the wing, cannot accomplish the object of the patent in suit of preventing tip stall on a highly swept wing.

L. COMMERCIAL SUCCESS AND LONG-FELT NEED.

L1. Plaintiffs have not proved that the alleged invention of the patent in suit has met with commercial success. Their proof in this regard is meager at best and consists of testimony that wings covered by the patent in suit had been used on Consolidated Vultee Aircraft Corporation's commercial airplanes, essentially the Models 240, 340, 440 and

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880 whose wings were claimed by Dr. Garbell to have been derived from the wing of the CVAC Model 110 designed at the time Dr. Garbell worked for CVAC. No sales or other documentation was ever presented at the trial to permit a meaningful appraisal of the commercial success, or to establish that such sales were attributable to the patent in suit.

L2. Dr. Garbell admitted that CVAC was the only licensee under the patent in suit. "On April 16, 1954," CVAC acquired a license to all of Dr. Garbell's patents for a \$8,302.79 judgment.

L3. When offered a license under the application which became the patent in suit, the evidence showed that airframe manufacturers considered the claimed invention to be old, unpatentable and not powerful enough to solve stall problems on swept wing jets.

L4. There is no evidence that CVAC or anyone ever constructed the wing by following the patent in suit.

L5. Plaintiffs have not met their burden of proving commercial success or long felt need. In any event these secondary considerations are inapplicable since the invalidity of the patent is not open to doubt.

M. ESTOPPEL.

M1. The defendants Boeing and McDonnell Douglas were not parties in the prior suit, involving this same patent, brought by plaintiffs on January 18, 1950 against Consolidated Vultee Aircraft Corporation (Civil Action No. 10930-Y).

M2. The Manufacturers Aircraft Association, Inc. was not a party in such prior suit, nor were any of its members, other than Consolidated Vultee Aircraft Corporation, a party in such action. The Manufacturers Aircraft Association, Inc. is a New York corporation having as its stockholders virtually every airframe manufacturer in the United States including Boeing and McDonnell Douglas. Each stockholder has one share of voting stock.

M3. The Manufacturers Aircraft Association is a patent service organization. It administers cross-license agreements for its members. It maintains a library devoted to the airplane art which includes copies of United States and foreign patents, books, magazines and other writings having subject-matters of interest to the airplane industry. It performs searches of the prior airplane art at the request and to assist its members in the conduct of their patent operations.

M4. There is no evidence whatsoever that either the Manufacturers Aircraft Association or its members bore any part of the litigation costs of, or in anywise controlled the conduct of the defense of the prior suit against Consolidated Vultee.

M5. There is no evidence that Manufacturers Aircraft Association bore any costs of present suit or controlled defense in any way or controlled preparation or investigation conducted by defendants in present case or CVAC case. Full and sole control of suit was by the defendants and all costs borne solely by defendants.

M6. The fact that Consolidated Vultee sought and obtained assistance from the Manufacturers Aircraft Association and various of the members in finding prior art which Consolidated Vultee used in its suit did not make the Association or its members parties to that prior suit.

M7. It is clearly reasonable that an airplane manufacturer, defending himself in a patent infringement suit involving his airplanes, should make inquiries of and seek assistance of other airplane manufacturers and any others having experience in the airplane art in his attempt to develop prior art.

M8. The defendants Boeing and McDonnell Douglas have the right in the present suit on Patent No. 2,441,758 to

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urge all appropriate defenses provided by the patent statutes of the United States.

M9. Substantial new evidence, both oral and documentary, by way of explanation and additional grounds for finding invalid were urged and proved in support of defendants' contentions in this case over and above that produced in the CVAC case.

M10. Boeing and McDonnell Douglas have the right to rely on the evidence produced in the CVAC case without being bound by the results in the trial of that action. Evidence presentation in that CVAC case took four days on infringement and validity as compared to twenty days in this case in addition to which there were twenty-nine days of hearings before the Special Master on prior art and McDonnell Douglas accused aircraft wing definition.

M11. Defendants are not bound by the trial court decision in the CVAC case and are not estopped to assert invalidity of the patent in suit.

J. JUSTIFICATION FOR AN AWARD OF ATTORNEYS' FEES.

N1. The plaintiffs before-trial proceedings in this action make this case one that is extraordinary.

N2. These actions were not filed or maintained in good faith.

N3. When deposed as to the basis for his filing of the complaint in this action against the defendant Boeing, Dr. Garbell stated, "I had visual evidence and comments of a seasoned airline pilot concerning the excellent stalling characteristics and the confidence of this pilot in his Boeing 707 in my very first flight on the airplane. These excellent stalling characteristics do not just happen by accident in a highly tapered and sweptback wing such as that of the 707". This first flight of Dr. Garbell's on the Boeing 707 occurred on December 25, 1960, and the pilot referred to is Wesley Gray. Dr. Garbell now knows that this Boeing 707 does not infringe the patent in suit.

N4. Plaintiffs failed to use reasonable care in assessing their allegation that the wing of the Boeing 707 infringed the patent in suit. Boeing filed a motion for an early and separate trial in the issue of infringement. Plaintiffs opposed the motion. Among other things they charged "that by no stretch of the imagination can" WBL-6 "constitute an airfoil section which defines . . . the exterior shape of" the 707-320 B/C wing. Plaintiffs now admit that the root section of the wing is that asserted by Boeing, i.e., WBL-6. Throughout the lengthy history of this case, plaintiffs have not sought to go to trial on the issue of infringement in the Boeing case.

N5. When deposed as to the basis for his filing of the complaint in this action against the defendant Douglas, Dr. Garbell stated that it was based on a single flight he had on a DC-8 on December 26, 1960. The flight was of 70 minutes duration.

N6. In the course of this litigation, defendant Douglas moved for partial summary judgment with respect to the DC-9 aircraft. Plaintiffs countered with a motion for partial summary judgment to have the DC-9 aircraft wing found to be a willful infringement. However, a few months later in the Special Master hearing, plaintiffs dropped any claim based on the DC-9 wing.

N7. Plaintiffs' failure, more than seven years after the case was filed with regard to the infringement allegation directed to the DC-8 airplane wings, to furnish new evidence as to the camber values of airfoil sections of such wings located inboard of the controlled airfoil section at the 28% station, though repeatedly requested to do so by the Special Master, was irresponsible and inexcusable.

N8. The plaintiffs denied requests for admissions directed to the airfoil section parameters, including mean-line

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camber, of the prior art Curtiss-Wright Models 21B and 23 aircraft. Issues as to the shape of such wings were tried by the Special Master and the Special Master made his findings with respect to such parameters. Plaintiffs objected to such findings before the Court trial; then at the trial, plaintiffs introduced documentary evidence which substantiated fully the Special Master's findings as to the wing geometry of those aircraft and also proved that the Models 21B and 23 wings showed aerodynamic improvements over previous Curtiss-Wright models. That the Curtiss-Wright Models 21B and 23 aircraft invalidate Claims 1, 2, 3 and 7 of the patent in suit appears elsewhere in these findings and in the Conclusions of Law.

N9. Plaintiffs put in evidence opinions that the patent in suit was anticipated.

N10. Plaintiffs put in evidence that a description of a wing design covered by the patent was circulated in the NACA, a public body, before the earliest date the patentee can claim as a reduction to practice, i.e., the filing date of the patent application.

N11. From the evidence offered by the plaintiffs, without limitation in Exhibits 686 and 695, the plaintiffs knew that patent was invalid and yet continued to pursue the action.

N12. Plaintiffs have used the patent in an attempt to exact undue tribute from the two defendants.

N13. The Pinguino sailplane designed by Dr. Garbell and Dr. Preti was described in printed publications in Europe in the '30s. In the patent in suit, Dr. Garbell referred to flight tests of the Pinguino as "demonstrating convincingly that each of the objects of this invention has been fully achieved". The Pinguino wing was expressly covered by Claim 3 of the continuation-in-part application which matured into Patent No. 2,498,262.

N14. Shortly after Dr. Garbell applied for the patent in suit, he acknowledged that the invention covered by the application had been test-flown before he went to work for CVAC. The test flights referred to were those of the Pinguino, described in printed publications many years before the patent application was filed.

N15. Notwithstanding, in both the original patent application and the continuation-in-part application which specifically claimed the Pinguino wing, Dr. Garbell signed an oath that the claimed invention had not been described in printed publications. Such conduct is below the standards of good faith and candor required of inventors dealing with the Patent Office.

N16. The plaintiffs had no meaningful evidence upon which to base their allegations of infringement prior to filing the complaints in these actions. They opposed Boeing's request for an early trial on the Boeing infringement issue. Plaintiffs refused to go to trial on

the remand to the Special Master for additional findings on the Douglas infringement issue, after they discovered his initial findings were unfavorable to them. Plaintiffs presented evidence in this trial which they have had in their possession since 1967, and which would support a finding that the patent was invalid.

N17. The conduct of plaintiffs as outlined in these finding is wholly unjustified and amounts to bad faith. It would be unconscionable to require defendants to bear the burden of their defense cost.

N18. Such conduct warrants an award of reasonable attorneys' fees which are fixed in the amount of \$237,062.50, the court finding that counsel for defendants have reasonably expended 18,525 hours in the legal work and litigation necessarily incurred and performed in the proper and adequate defense of this action.

The following Conclusions of Law, insofar as they may be considered Find-

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ings of Fact, are also found by the Court to be true in all respects.

From the foregoing facts, the Court concludes as set forth hereafter.

CONCLUSIONS OF LAW

1. This Court has jurisdiction of the parties and of the subject matter of these actions.

2. The patent in suit and Claims 1, 2, 3 and 7 do not meet the test of novelty and utility within the meaning of 35 U.S.C. sec. 101¹² and are therefore invalid.

3. Each of Claims 1, 2, 3 and 7 covers the prior art Curtiss-Wright Models 21B and 23 wings. Since such wings would infringe if new and anticipate if old, the

alleged invention does not meet the test of novelty under 35 U.S.C. sec. 101.

4. The subject matter of Claims 1, 2, 3 and 7 of the patent in suit involves the mere substitution of equivalents which do substantially the same thing in the same way as prior art devices described in the Zien article, the Lachmann article, the Cronstedt patent and in the Pinguino and Arcore sailplane articles and therefore is not such an invention as will sustain a patent under 35 U.S.C. sec. 101. *Dow Chemical Co. v. Halliburton Oil Well Cem. Co.*, 324 U.S. 320, 330, 65 S.Ct. 647, 89 L.Ed. 973 (1945); *Elliott Core Drilling Co. v. Smith*, 50 F.2d 813, 816 (9th Cir. 1931); *Kwik Set, Inc. v. Welch Grape Juice Co.*, 86 F.2d 945, 947 (2nd Cir. 1936); *Hazeltine Corporation v. General Motors Corporation*, 131 F.2d 34, 39 (3rd Cir. 1942); *Talon, Inc. v. Union Slide Fastener, Inc.*, 266 F.2d 731, 735 (9th Cir. 1959).

1/5. To the extent that the validity of Claims 1, 2, 3 and 7 of the patent in suit depends on a combination of elements that produces in some way or manner a surprising or unusual result which would have been expected by a person having ordinary skill in the art, the patent in suit does not meet this test. *Great Atlantic and Pacific Tea Co. v. Supermarket Equipment Corp.*, 340 U.S. 147, 71 S.Ct. 127, 95 L.Ed. 162 (1950); *Anderson's Black Rock, Inc. v. Pavement Salvage Co., Inc.*, 396 U.S. 57, 90 S.Ct. 305, 24 L.Ed.2d 258 (1969); *Spring Crest Company v. American Beauti Pleat, Inc.*, 420 F.2d 950, 951 (9th Cir. 1970); *Hamlow v. Scientific Glass Apparatus Corp.*, 421 F.2d 173, 174 (9th Cir. 1970).

6. Removal of the tip panel from the Zien wing results in a wing covered by Claims 1, 2, 3 and 7 of the patent in suit. Such "omission of an element and the function of the element in a prior art device does not constitute invention" which 35 U.S.C. sec. 101 declares to be patentable. *Richards v. Chase Elevator Co.*, (1895) 159 U.S. 477, 486, 16 S.Ct. 53, 40 L.Ed. 225; *Grayson Heat Control v. Los Angeles*, 134 F.2d 478, 481 (9th Cir. 1943).

7. Claims 1, 2, 3 and 7 of the patent in suit cover structures which are capable of achieving the type of stall which the patentee desires, as illustrated in Figure 2 and which practical experience rejects as dangerous. Such claims read upon non-useful structures, therefore, and lack statutory utility. In re Cook & Merigold, 439 F.2d 730, 735, 58 CCPA 1049 (1971); Graver Tank & Mfg. Co. v. Linde Air Products, 336 U.S. 271, 276-277, 69 S.Ct. 535, 93 L.Ed. 672 (1949).

8. Claims 1, 2, 3 and 7 of the patent in suit are invalid for the reason that they read upon non-useful embodiments and inoperative embodiments in highly-swept wings. The claims therefore lack statutory utility within the meaning of 35 U.S.C. sec. 101. Butterfield v. Oculus Contact Lens Co., Inc., 332 F.Supp. 750, (D.C.N.D.Ill., 1971). In re Cook & Merigold, 439 F.2d 730, 735, 58 CCPA 1049 (1971).

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9. It is concluded that no person or entity ever reduced the alleged invention to practice on behalf of, or as agent for, the patentee and that the earliest date on which plaintiffs can rely is the constructive reduction to practice occurring on July 16, 1946, with the filing of the application which matured into the patent in suit. Consolidated Vultee Aircraft Corporation v. Garbell, 204 F.2d 946, 949 (9th Cir. 1953).

10. The subject matter of the patent was well known by others prior to the time of the alleged invention within the meaning of 35 U.S.C. sec. 102(a).¹³ The Curtiss-Wright Models 21B and 23 anticipate and read on Claims 1, 2, 3 and 7 of the patent in suit and consequently devices covered by such claims were known or used by others prior to the time of the alleged invention within the meaning of 35 U.S.C. sec. 102(a). These claims are invalid thereunder. Monolith Portland Midwest Co. v. Kaiser Aluminum & Chemical Corporation, 267 F.Supp. 726, 783 (D.C. Cal. 1966), modified as to amount of attorneys' fees awarded to defendant, 407 F.2d 288 (9th Cir. 1969).

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11. Claims 1, 2, 3 and 7 of the patent in suit read upon the wing of the Curtiss-Wright Model 23 and the wing of the Curtiss-Wright Model 21-B. The Curtiss-Wright Model 23 and the Model 21-B were in public use and on sale in this country more than one year prior to the date of the application which matured into the patent in suit, within the meaning of 35 U.S.C. sec. 102(b).¹³ Celite Corp. v. Dicalite Corp., 96 F.2d 242 (9th Cir. 1938); H.K. Regar & Sons v. Scott & Williams, Inc., 63 F.2d 229 (2nd Cir. 1933); Monolith Portland Midwest Co. v. Kaiser Aluminum & Chemical Corporation, 267 F.Supp. 726, 783 (D.C. Cal. 1966), modified as to amount of attorneys' fees awarded to defendant, 407 F.2d 288 (9th Cir. 1969); Piet v. United States, 176 F.Supp. 576 (D.C.S.D. Cal. 1959), aff'd per curiam 283 F.2d 693 (9th Cir. 1960).

12. The Zacher article on the D-30 Cirrus was a "printed publication" within the meaning of 35 U.S.C. sec. 102(b). Bild 5, or Figure 5, of the Zacher article shows a camber distribution for the D-30 Cirrus wing on which claims 1, 2, 3 and 7 of the patent in suit read. Thus, the invention was described in a printed publication in a foreign country more than one year prior to the filing of the application which matured into the patent in suit.

13. The XB-46 wing, covered by Claims 1, 2, 3 and 7 of the patent in suit, as described in the specification submitted by CVAC to the Air Force, was on sale more than one year prior to the date of the application which matured into the patent in suit, within the meaning of 35 U.S.C. sec. 102(b). A wind tunnel model of the XB-46 airplane wing covered by Claims 1, 2, 3 and 7 of the patent in suit, was sold and delivered to the United States Government more than one year prior to the date of the application which matured into the patent in suit. Elizabeth v. Pavement Co., 97 U.S. 126, 135, 24 L.Ed. 1000 (1877); Piet v. United States, 176 F.Supp. 576, 581-584 (D.C. Cal. 1959), aff'd per curiam, 283 F.2d 693 (9th Cir. 1960); Amphenol Corp. v. General Time Corp., 397 F.2d 431, 433 (7th Cir. 1968); Tucker Aluminum

- Appendix A-73 -

Products, Inc. v. Grossman, 312 F.2d 293 (9th Cir. 1963). There were absolutely no conditions of secrecy imposed by the inventor, Dr. Garbell, on the United States Government or on CVAC, the contractor, or imposed by CVAC on the United States Government. The invention was therefore on sale within the meaning of 35 U.S.C. sec. 102(b) more than one year prior to the date of application which matured into the patent in suit. Piet v. United States, 176 F.Supp. 576, 584 to

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586 (D.C.Cal.1959), affirmed per curiam, 283 F.2d 693 (9th Cir. 1960).

14. A proposal for a two-engine tailless airplane was presented to the United States Government by Dr. Garbell and others on behalf of CVAC more than one year prior to the date of the application which matured into the patent in suit, for the purpose of selling such airplanes to the Government. Claims 1, 2, 3 and 7 of the patent in suit cover the wing described in the tailless airplane proposal. By reason of such selling activity, the invention was on sale more than one year prior to the application date within the meaning of 35 U.S.C. sec. 102(b).

15. More than one year prior to the date of the application which matured into the patent in suit, Mr. Ira Abbott of the National Advisory Committee on Aeronautics (NACA) proposed a new wing design for the XB-36 airplane, which design was covered by Claim 11 of the patent in suit. A description of the model and results of tests of the wind tunnel model covered by Claim 11 and embodying a design similar to Mr. Abbott's design for an improved XB-36 wing were reported in a printed publication more than one year prior to the date of application for the patent in suit. Claim 11 is not patentably distinct from Claims 1, 2, 3 and 7 and therefore the invention covered in Claims 1, 2, 3 and 7 were described in a printed publication more than one year prior to the date of application which matured into the patent in suit within the meaning of 35 U.S.C. sec.

102(b). Tool Research and Engineering Corp. v. Honcor Corp., 367 F.2d 449, 454 (9th Cir. 1966); Super Mold Corporation v. Clapp's Equipment Division, Inc., 397 F.2d. 932 (9th Cir. 1968), rehearing denied; 2 Walker, Patents (Deller's 2nd Ed., 1964) sec. 141; Talon, Inc., v. Union Slide Fastener, Inc., 266 F.2d 731, 735 (9th Cir. 1959).

16. More than one year prior to the date of the application for the patent in suit, Dr. Garbell submitted a manuscript containing a description of the teachings and subject matter of his alleged invention to the Institute of Aeronautical Sciences (IAS) with the intent that said manuscript would be published. The manuscript was distributed by the IAS to a great number of people in the airframe industry. Dr. Garbell's manuscript constituted a printed publication of the alleged invention more than one year prior to the date of the application which matured into the patent in suit within the meaning of 35 U.S.C. sec. 102(b). Hamilton Laboratories v. Massengill, 111 F.2d 584 (6th Cir. 1940); Application of Tenney, 254 F.2d 619, 45 C.C.P.A. 894 (1958); Garrett Corporation v. United States, 422 F.2d 874, 878, 190 Ct.Cl. 858 (1970); Philips Electronic & Pharmaceutical Industries Corp. v. Thermal and Electronics Industries, Inc., 450 F.2d 1164 (3rd Cir. 1971).

17. The wing of the Curtiss-Wright Models 21-B and 23 was a prior invention (i.e., reduced to practice prior to July 16, 1945) which was not abandoned, suppressed or concealed within the meaning of 35 U.S.C. sec. 102(g).¹⁴ Corona Cord Tire Co. v. Dovan Chemical Corp., 276 U.S. 358, 48 S.Ct. 380, 72 L.Ed. 610 (1928).

18. The subject matter of the patent in suit, taken as a whole, would have been obvious to persons of ordinary skill in the art prior to the time of the alleged invention, 35 U.S.C. sec. 103,¹⁵ Graham v. John Deere Co. of Kansas City, 383 U.S. 1, 86 S.Ct. 684, 15 L.Ed.2d 545 (1965); Walker v. General Motors Corporation, 362 F.2d 56 (9th Cir. 1966); Great Atlantic and Pacific Tea Co. v. Supermarket Equipment Corp., 340 U.S. 147, 71 S.Ct.

127, 95 L.Ed. 162 (1950).

19. The teachings of the Zien article, the Zacher article, the Lachmann article,

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the Lombard article, the Cronstedt patent and numerous NACA technical reports and technical notes in evidence, singly or in combination, render the subject matter of the patent in suit obvious to persons of ordinary skill in the art prior to the time of the alleged invention within the meaning of 35 U.S.C. sec. 103.

20. Invalidity of the patent is not in doubt and therefore secondary considerations of commercial success and long-felt need have no relevancy. However, plaintiffs have not established commercial success attributable to the patented wing. *Heath v. Frankel*, 153 F.2d 369 (9th Cir. 1946), cert. denied, 328 U.S. 844, 66 S.Ct. 1025, 90 L.Ed. 1618. The evidence establishes that there was no long-felt need. *Jeddeloh Brothers Sweed Mills, Inc. v. Coe Manufacturing Co.*, 375 F.2d 85 (9th Cir. 1967).

21. The teachings of the patent in suit cannot be employed without the necessity for an elaborate experimentation. Each of Claims 1, 2, 3 and 7 of the patent in suit is drawn so broadly as to encompass innumerable embodiments, some of which may achieve the objects of the patent, and many of which may not achieve the objects of the alleged invention. Knowing nothing more than the fact that one or more of the claims in issue reads upon a given device, one can have no assurance that said device would achieve the functional objects of the patent without elaborate testing both in wind tunnel and in flight conditions. The specification does not provide sufficient guidance to remove the necessity for independent experimentation. It is the conclusion of this Court that the disclosure of the patent in suit lacks sufficient precision to meet the requirement of 35 U.S.C.

sec. 112.¹⁶ *H.C. Baxter and Bros. v. Great Atlantic and Pacific Tea Co.*, 236 F.Supp. 601, 611 (D.C. Me. 1964); *Reeves Brothers, Inc. v. U.S. Laminating Corp.*, 282 F.Supp. 118, 128 (D.C.E.D.N.Y.1968).

22. The specification does not teach one skilled in the art how to avoid tip stall on swept wings for use on commercial jet transports and for that reason is void under 35 U.S.C. sec.112. *O'Reilly v. Morse*, 56 U.S. (15 How.) 62, 119, 14 L.Ed. 601 (1853).

23. The specification provides no guidance to the user of arbitrary airfoil sections on the critical matter of ascertaining mean lines in arbitrary airfoil sections where the mean line was not pre-selected. The specification for this reason does not meet the requirements of 35 U.S.C. sec. 112.

24. The patent in suit and each of Claims 1, 2, 3 and 7 fail to define the exterior shape of a wing in that the claims speak only in terms of relative camber distribution and encompass an infinite variety of wing shapes. One skilled in the art is compelled to experiment in order to find an operable combination. The patentee therefore has claimed more than his purported invention and the claims are thus void under 35 U.S.C. sec. 112. *Libbey Owens-Ford Glass Co. v. Celanese Corp.*, 135 F.2d 138, 146 (6th Cir. 1943).

25. The term "mean-line camber" as used in Claims 1, 2, 3 and 7 of the patent in suit, has more than one definition. Infringement or non-infringement of these claims depends on which definition is used. Two persons skilled in the aerodynamics art working with the identical airfoil shape could find two different mean line camber values for the airfoil section. Since the claims cover relative camber values, one aerodynamicist could find infringement while the other aerodynamicist could find non-infringement for the same wing. For this reason, it is concluded that Claims 1, 2, 3 and 7 of the patent in suit do not meet the requirement of 35 U.S.C. sec. 112.

26. Claims 2, 3 and 7 of the patent in suit incorporate the diagrams of the patent, such as Figure 2 and Figure 4. Figure 2, for example, purports to show values, by curve 6, of the "spanwise distribution of the actually prevailing section lift coefficients" (Col. 5, lines 1 and 2) and by curves 9, 11 and 8, the "spanwise distribution of maximum attainable section lift coefficients" (Col. 5, lines 14 and 15). "Actually prevailing" means just that. The only way to ascertain the "actually prevailing" values on high speed jet wings is by test. So, to establish the "actually prevailing" values on a swept wing to determine infringement would require, at the very minimum, model tests and flight test of some complexity. Similarly, the data required to draw the enveloping "curvilinear polygon" for a highly swept wing requires tests. The patentee does not show how to predict the behavior of highly swept-back wings of high speed jets which were unconventional in 1946. The patentee did not, and presumably could not, explain how to arrive at either the diagrams or the wing itself in the case of highly swept wing having airfoil sections not related to one another. Thus, the public, in order to determine whether or not a proposed construction would come within the terms of the claims, would be required to conduct extensive testing. Therefore, since "the inventor must inform the public during the life of the patent of the limits of the monopoly asserted, so that it may be known which features may be safely used or manufactured without a license and which may not", Claims 2, 3 and 7 of the patent in suit do not meet the requirement of 35 U.S.C. sec. 112. *General Electric Co. v. Wabash Appliance Corp.*, 304 U.S. 364, 369, 58 S.Ct. 899, 901, 82 L.Ed. 1402 (1938). Claims 2, 3 and 7 of the patent in suit do not meet the requirement of 35 U.S.C. sec. 112 in that "no inventor may compel independent experimentation by others to ascertain the bounds of his claims". *Standard Oil v. Tide Water Associated Oil Co.*, 154 F.2d 579, 582-583 (3rd Cir. 1946).

27. To the extent that Claims 2, 3 and 7 of the patent in suit purport to express functional limitations on otherwise broadly defined structures, said claims are invalid for the reason that said limitations appear at the point of novelty and for the further reason that the specification is an inadequate guide to defining the acts and structures implied by said functional limitations. *Cementing Co. v. Walker*, 329 U.S. 1, 67, 67 S.Ct. 6, 91 L.Ed. 3 (1946); *Stearns v. Tinker & Rasor*, 252 F.2d 589, 599 (9th Cir. 1957).

/3, 4/ 28. The usual presumption of patent validity (35 U.S.C. sec. 282) is vitiated in this case by reason of the fact that the applicant did not cite to the Patent Office, and the Patent Office did not consider, the most pertinent prior art, including the Curtiss-Wright Models 23 and 21B airplanes, the Zien article, the Lachmann article, the Lombard article, the Zacher article, and N.A.C.A. Report Nos. 572, 703 and 713, all of which prior art aircraft and references are more pertinent than the references cited by the Patent Office. *Pressteel Co. v. Halo Lighting Products, Inc.*, 314 F.2d 695 (9th Cir. 1963); *Monroe Auto Equipment Company v. Superior Industries, Inc.* 332 F.2d 473 (9th Cir. 1964); *Henderson v. A.C. Spark Plug Division of General Motors Corp.*, 366 F.2d 389 (9th Cir. 1966) *Groen v. General Foods Corporation*, 402 F.2d 708 (9th Cir. 1968). The patentee is charged with full consequences of all prior knowledge or use by others. *Everlube Corporation of America v. Electrofilm, Inc.*, 154 F.Supp. 788, 803 (D.C. Cal. 1957), option adopted on appeal, 265 F.2d 495 (9th Cir. 1959); *Condenser Corporation of America v. Micamold Radio Corp.*, 145 F.2d 878 (2d Cir. 1944); *Bone v. Marion County*, 251 U.S. 134, 40 S.Ct. 96, 64 L.Ed. 188 (1919).

/5/ 29. The initial findings of the trial court in the case of Maurice A.

Garbell, Inc. v. Consolidated Vultee Aircraft Corp., 94 F.Supp. 843 (D.C. Cal. 1950), have no force or effect upon

the disposition of these actions because of the ultimate dismissal of the complaint therein with prejudice. Electrical Fittings Corporation v. Thomas and Betts Co., 307 U.S. 241, 59 S.Ct. 860, 83 L.Ed. 1263 (1939); Harries v. Air King Products Co., 183 F.2d 158 (2nd Cir. 1950).

/6/ 30. The evidence shows, and the Court concludes, that defendants McDonnell Douglas Corporation and The Boeing Company were not parties or privies to the prior action against CVAC. Defendants McDonnell Douglas Corporation and The Boeing Company are not estopped to attack the validity of the patent in suit by any prior judgment of which this Court has been apprised. Boutell v. Volk, 449 F.2d 673, 678 (10th Cir. 1971); Hy-Lo Unit & Metal Products Company v. Remote Control Mfg. Co., Inc., 83 F.2d 345 (9th Cir. 1936). This Court considered the initial findings of the trial court in the prior action against CVAC and they are not persuasive for the reason that defendants herein have presented far more evidence on the question of patent invalidity than was presented by defendant CVAC in the prior action. Mast, Foos' Co. v. Stover Mfg. Co., 177 U.S. 485, 488-489, 20 S.Ct. 708, 710, 44 L.Ed. 856 (1900).

/7/ 31. The Court concludes from the evidence presented that the patent in suit is invalid since it lacks novelty and utility under 35 U.S.C. sec. 101, that the purported invention was anticipated under 35 U.S.C. sec. 102, that the subject matter of the patent was obvious to one skilled in the art at the time of the alleged invention under 35 U.S. sec. 103, and that the teachings of the patent are insufficient and the claims ambiguous under 35 U.S.C. sec. 112.

/8/ 32. The Court concludes that the continued prosecution of these actions through trial was done in bad faith and makes the case an exceptional one warranting an award of attorneys' fees within the meaning of 35 U.S.C. sec. 285. Shingle Products Patents v. Gleason, 211 F.2d 437 (9th Cir. 1954); Talon, Inc. v. Union Slide Fastener, Inc., 266 F.2d 731 (9th Cir. 1959); Tidewater Patent Development Co., Inc. v. Kitchen, 371

F.2d 1004 (4th Cir.) cert. denied 389 U.S. 821, 88 S.Ct. 46, 19 L.Ed.2d 74 (1967); Monolith Portland Midwest Co. v. Kaiser Aluminum & Chemical Corp., 267 F.Supp. 726, modified 407 F.2d 288 (9th Cir. 1969); Kaehni v. Diffraction Co., Inc., 3241 F.Supp. 523 (D.C.Md.1972) aff'd 473 F.2d 908 (4th Cir. 1973); L.F. Strassheim Co. v. Gold Metal Folding Furniture, 477 F.2d 818 (7th Cir. 1973).

33. Any and all of the foregoing Conclusions of Law which may be deemed to constitute Findings of Fact are hereby adopted as Findings of Fact.

Let judgment be entered accordingly.

See Appendix on next page.

(In the reprint, this page is followed by the footnotes and "Appendix B". "Appendix A", which is a less than readily readable photocopy of the patent in suit, is reproduced in large type in a separate Appendix D to the Petition for Writ of Certiorari).

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end

FOOTNOTES

Footnote 1 (appearing at 385 F.Supp. 1, 9, and on page "Appendix A-17" of this reprint).

"See Appendix A" (Appendix D of this reprint).

Footnote 2 (appearing at 385 F.Supp. 1, 9, and on page "Appendix A-17" of this reprint).

Sec. 271. Infringement of patent.

(a) Except as otherwise provided in this title, whoever without authority makes, uses or sells any patented invention, within the United States during the term of the patent therefor, infringes the patent.

(b) Whoever actively induces infringement of a patent shall be liable as an infringer.

(c) Whoever sells a component of a patented machine, manufacture, combination or composition, or a material or apparatus for use in practicing a patented process, constituting a material part of the invention, knowing the same to be especially made or especially adapted for use in an infringement of such patent, and not a staple article or commodity of commerce suitable for substantial noninfringing use, shall be liable as a contributory infringer.

(d) No patent owner otherwise entitled to relief for infringement or contributory infringement of a patent shall be denied relief or deemed guilty of misuse or illegal extension of the patent right by reason of his having done one or more of the following: (1) derived revenue from acts which if performed by another without his consent would constitute contributory infringement of the patent; (2) licensed or authorized another to perform acts which if performed without his consent would constitute contributory infringement of the patent; (3) sought to enforce his patent rights against infringement or contributory infringement. July 19, 1952, c.950, sec. 1, 66 Stat. 811.

Footnote 3. (appearing at 385F.Supp. 1, 10, and on page "Appendix A-17" of this reprint).

Sec. 281. Remedy for infringement of patent.

A patentee shall have remedy by civil action for infringement of his patent. July 19, 1952, c.950, sec. 1, 66 Stat. 812.

Footnote 4. (appearing at 385 F.Supp. 1, 10, and on page "Appendix A-17" of this reprint).

28 Sec. 1338 JUDICIARY - PROCEDURE Note 1

Sec. 1338. Patents, plant variety protection, copyrights, trade-marks, and unfair competition.

(a) The district courts shall have original jurisdiction of any civil action arising under any Act of Congress relating to patents, plant variety protection, copyrights and trade-marks. Such jurisdiction shall be exclusive of the courts of the states in patent, plant variety protection and copyright cases.

(b) The district courts shall have original jurisdiction of any civil action asserting a claim of unfair competition when joined with a substantial and related claim under the copyright, patent, plant variety protection or trade-mark laws.

As amended Dec. 24, 1970, Pub.L. 91-577, Title III, Sec. 143(b), 84 Stat. 1559.

Footnote 4a. (appearing at 385 F.Supp. 1, 10, and on page "Appendix A-18" of this reprint).

"See Appendix A" (appearing as Appendix D in this reprint, in a volume separate from the present volume of reprints of "Opinions Below").

Footnote 5. (appearing at 385 F. Supp. 1, 10, and on page "Appendix A-18" of this reprint).

"See Appendix B" (appearing on page "Appendix A-88" of this reprint).

Footnote 6. (appearing at 385 F.Supp. 1, 10, and on page "Appendix A-18" of this reprint).

Sec. 101. Inventions patentable

Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title. July 19, 1952, c.950, sec. 1, 66 Stat. 797.

Footnote 7. (appearing at 385 F.Supp. 1, 10-11, and on page "Appendix A-18" of this reprint).

Sec. 102. Conditions for patentability; novelty and loss of right to patent

A person shall be entitled to a patent unless -

(a) The invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for patent, or

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of the application for patent in the United States, or

(c) he has abandoned the invention, or

(d) the invention was first patented or caused to be patented by the applicant or

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Page 11

his legal representatives or assigns in a foreign country prior to the date of the application for patent in this country on an application filed more than twelve months before the filing of the application in the United States, or

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or

(f) he did not himself invent the subject matter sought to be patented, or

(g) before the applicant's invention thereof the invention was made in this country by another who had not abandoned, suppressed, or concealed it. In

determining priority of invention there shall be considered not only the respective dates of conception and reduction to practice of the invention, but also the reasonable diligence of one who was first to conceive and last to reduce to practice, from a time prior to conception by the other. July 19, 1952, c.950, sec. 1, 66 Stat. 797.

Footnote 8. (appearing at 385 F.Supp 1, 11, and on page "Appendix A-18" of this reprint).

Sec. 103. Conditions for patentability; nonobvious subject matter

A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made. July 19, 1952, c.950, sec.1, 66 Stat. 798.

Footnote 9. (appearing at 385 F.Supp. 1, 11, and on page "Appendix A-18" of this reprint).

Sec. 112. Specification

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same, and shall set forth the best mode contemplated by the inventor of carrying out his invention.

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

An element in a claim for a combination may be

expressed as a means or step for performing a specified function without the recital of structure, material, or acts in support thereof, and such claim shall be construed to cover the corresponding structure, material, or acts described in the specification and equivalents thereof. July 19, 1952, c.950, sec. 1, 66 Stat. 798.

Footnote 10. (appearing at 385 F.Supp. 1, 24-25, and on page "Appendix A-45" of this reprint).

(A reproduction of the so-called "Cronstedt patent, U.S. Patent No. 1,547,644, Figures 1 through 5 thereof, on a single sheet, shown on page "Appendix A-87" hereof)

Footnote 11. (appearing at 385 F.Supp. 1, 26, and on page "Appendix A-45" of this reprint; the content or meaning of footnote 11 is not identified at 385 F.Supp. 1, 26, but may perhaps refer to the depiction at 385 F.Supp. 1, 7, appearing on page "Appendix A-13" of the present reprint).

Footnote 12. (appearing at 385 F.Supp. 1, 39, and on page "Appendix A-70" of this reprint).

"Footnote 6 - See page 10."

Footnote 13. (appearing at 385 F.Supp. 1, 40, and on page "Appendix A-72" of this reprint).

"Footnote 7 - page 10."

Footnote 14. (appearing at 385 F.Supp. 1, 41, and on page "Appendix A-75" of this reprint).

"Footnote 7 - See page 10."

Footnote 15. (appearing at 385 F.Supp. 1, 41, and on page "Appendix A-75" of this reprint).

"Footnote 8 - See page 11."

Footnote 16. (appearing at 385 F.Supp. 1, 42, and on page "Appendix A-77" of this reprint).

"Footnote 9 - See page 11."

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10.

July 28, 1925.

V. CRONSTEDT

AEROFOIL

Filed Oct. 31, 1921

1,547,644

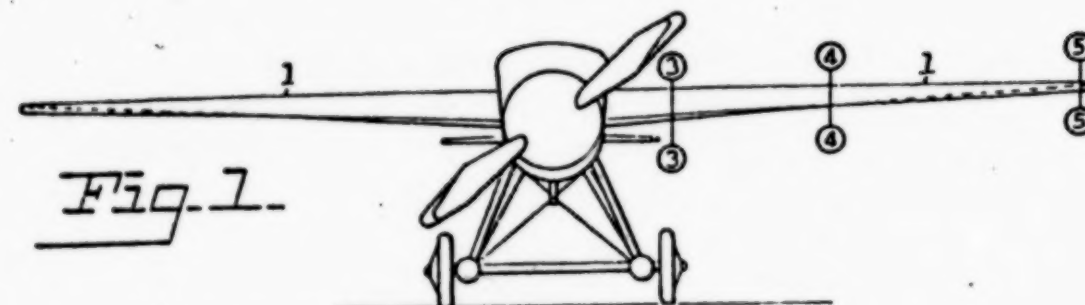


Fig. 1-



Fig. 3-



Fig. 4-

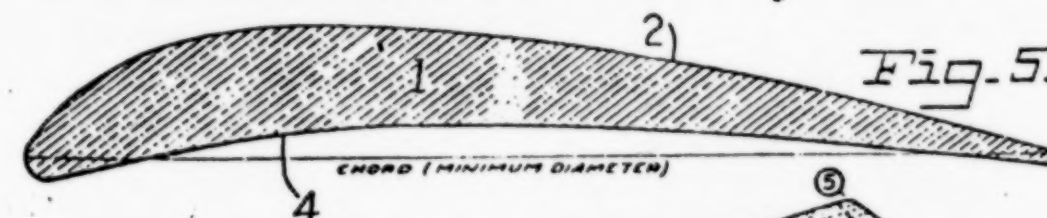


Fig. 5-

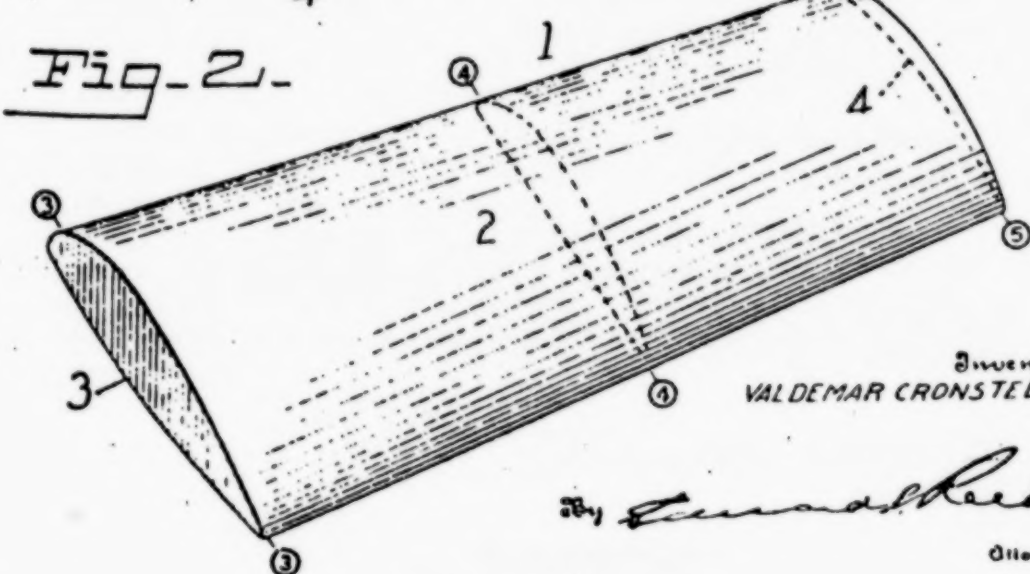


Fig. 2-

Inventor
VALDEMAR CRONSTEDT.

By *Wm. A. Reed*
Attorney

- Appendix A-87 -

Beginning
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APPENDIX B

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UNITED STATES DISTRICT COURT
CENTRAL DISTRICT OF CALIFORNIA

MAURICE A. GARBELL, INC., et al.,
Plaintiffs,
v.

THE BOEING COMPANY, INC.,
Defendant.

- Appendix A-88 -

Civil Action No. 63-658-AAH

MAURICE A. GARBELL, INC., et al.,
Plaintiffs,
v.

DOUGLAS AIRCRAFT COMPANY, INC.
Defendant.

Civil Action No. 63-659-AAH

ORDER

On Friday, May 14, 1971, plaintiffs' motion for continuance of the trial previously set for June 1, 1971, came on to be heard at 9:30 A.M. in the United States District Court for the Central District of California, 312 North Spring Street, Los Angeles, California, the Honorable A. Andrew Hauk, Judge, presiding.

Having reviewed all briefs, affidavits and documents pertaining to plaintiffs' motion for a continuance of the trial date, and related motions, and having heard all arguments of counsel pertaining to said motion, and good cause appearing therefor,

IT IS HEREBY ORDERED:

1. Plaintiffs' motion for continuance of the trial date from the previously set date of June 1, 1971, is denied:

2. Trial will commence on June 1, 1971, at 9:30 A.M., and the taking of evidence will be confined to the subject of patent invalidity or patent validity, and all defenses raised by defendants tending to show the invalidity of the patent in suit.

3. Plaintiffs will commence the trial by placing the patent in evidence, and if they wish, may then present additional testimony relating to the invention covered by the patent.

- Appendix A-89 -

4. Defendants will then present evidence in support of the invalidity contentions and have the burden of going forward with the evidence on all issues of invalidity inclusive of the issue of reduction to practice, or lack of reduction to practice, with plaintiffs to present all evidence in opposition and rebuttal thereof, with rebuttal by defts. and surrebuttal by plaintiffs, if any, respectively they desire to present.

5. At the conclusion of the taking of evidence on all issues pertaining to patent validity and patent invalidity, the Court will set a date for final argument

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and due dates for the filing of post-trial briefs. At the final argument, each side will have one hour in which to present closing arguments.

6. Thereafter, the Court will announce its judgment. If, in the Court's judgment, the patent is invalid, the Court will hear arguments on the question of whether or not the Court should make the appropriate findings under Rule 54 of the Federal Rules of Civil Procedure requisite to entering a final judgment. If the Court's judgment is that the patent is valid, the Court thereupon will set a date for the resumption of the trial on the issues of patent infringement, or non-infringement in the actions.

IT IS SO ORDERED this 27th day of May, 1971.

/s/ A. Andrew Hauk

A. Andrew Hauk

UNITED STATES DISTRICT
JUDGE

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end

APPENDIX B

OPINION AND DECISION OF THE COURT OF APPEALS FOR THE NINTH CIRCUIT

Federal Reporter, Second Series,
Volume 546, Pages 297 through 301.

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Footnotes	Pages B-7 through B-9

*

MAURICE A. GARBELL, INC., a California Corporation,
and Garbell Research Foundation, a California Non
profit Corporation, Appellants,

v.

The BOEING COMPANY, a Delaware Corporation,
Appellee.

MAURICE A. GARBELL, INC., a California Corporation,
and Garbell Research Foundation, a California Non-
profit Corporation, Appellants,

v.

McDONNELL DOUGLAS CORPORATION, Appellee.

No. 74-1017.

United States Court of Appeals,
Ninth Circuit.

Nov. 10, 1976.

Rehearing and Rehearing En Banc
Denied Dec. 28, 1976.

Assignees of patent covering a fluid foil lifting surface brought action for infringement. The District Court for the Central District of California, A. Andrew Hauk, J., 385 F.Supp. 1, entered judgment in favor of defendants and awarded attorney's fees and costs to defendants and assignees appealed. The Court of Appeals, Goodwin, Circuit Judge, held that evidence sustained findings that patent did not meet the tests of novelty and utility and was anticipated by prior art, that the invention had been on sale for more than one year prior to the date of the application, that the subject matter of the patent was obvious to one skilled in the art, and that teachings were insufficient and the claims were ambiguous; that award of attorney's fees was justified; and that award in the amount of \$237,062.50

was not excessive in view of fact that the proceedings in the district court had taken ten years.

Affirmed.

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George B. White (argued), San Francisco, Cal., for appellants.

Richard B. Hoegh (argued), Hahn, Cazier, Thornton, Hoegh & Leff, Los Angeles, Cal., for appellees.

Before GOODWIN and SNEED, Circuit Judges, and EAST,* District Judge.

GOODWIN, Circuit Judge:

Maurice A. Garbell, Inc., and Garbell Research Foundation appeal an adverse judgment in this patent infringement suit against The Boeing Company and McDonnell Douglas Corporation claiming infringement of Claims 1, 2, 3, and 7 of the Garbell Patent No. 2,441,758.

The Garbell plaintiffs acquired the patent by assignment from the patentee, Dr. Maurice A. Garbell. After several years of discovery and an extended trial the defendants prevailed on all counts.¹ The court awarded attorney's fees of \$237,062.50 to the defendants pursuant to 35 U.S.C. sec. 285.

I. Patent Validity

The patent in suit is entitled "Fluid Foil Lifting Surface," and concerns the shape of airplane wings. The district court held that this patent has almost every defect known to patent law: it did not meet the test of novelty and utility as required by 35 U.S.C. sec. 101;² it was anticipated by prior art and thus was invalid under 35 U.S.C. sec. 102(a);³ the invention had been on sale and in public use more than one year prior to the date of the application for the patent as contemplated by 35

U.S.C. sec. 102(b);⁴ the subject

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matter of the patent was obvious to one skilled in the art and thus the patent was invalid under 35 U.S.C. sec. 103;⁵ and the teachings of the patent were insufficient and the claims ambiguous under 35 U.S.C. sec. 112.⁶

Dr. Garbell's wing design utilizes three airfoil sections. An airfoil section represents a cross section of the wing at various points along its width. One property of an airfoil section is its meanline camber. Dr. Garbell claims that his wing embodies a novel and unique relationship between the meanline cambers of the airfoil sections.⁷ The Garbell wing design is said to reduce the danger of uncontrollable stalls in the aircraft.

The district court was not convinced that Garbell's design constituted a novel or unique approach to wing geometry. The court found, as noted, that the invention had been anticipated by prior art. For example, the Curtiss-Wright Co. built a series of planes which by 1940 included models CW-21(b) and CW-23. The issue of the geometry of the wings of these Curtiss-Wright models was referred to a Special Master. The finding of the Special Master (adopted by the district court) was that the geometry of the wings of the Curtiss-Wright planes embodied the same combination of elements as Claims 1, 2, 3, and 7 of the Garbell patent.

The court also found that the essence of the Garbell Wing had been published and was well known more than one year prior to his patent application. This knowledge was imparted through reports and publications by Garbell himself as well as by other aeronautical engineers and the National Advisory Committee on Aeronautics. Although no other wing description exactly duplicated the Garbell wing, the court found that a consideration of the totality of the prior publications would render the wing design obvious to a skilled member of the airframe industry.

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Additionally, the court found that the Garbell Wing was on sale more than one year prior to the date of the patent application and that Garbell actively participated in those sales efforts. Finally, the court adopted a finding that the teachings of the patent did not give sufficient guidance to the public so as to avoid the necessity for extensive experimentation to make the patent operable.

/1/ In reaching its findings, the court relied upon evidence produced in lengthy proceedings which included the testimony of several expert witnesses and the interpretation of numerous scientific exhibits. Unless found to be clearly erroneous, the findings of the district court must be upheld. Fed.R.Civ.P.52(a); Tri-Tron International v. A. A. Velto, 525 F.2d 432 (9th Cir.1975); W. S. Shamban and Co. v. Commerce and Industry Insurance Co., 475 F.2d 34 (9th Cir. 1973).

/2/ After a review of the record in this case, we cannot say that these findings are clearly erroneous. Since the district court applied the correct law to the findings, we must affirm the judgment as to the invalidity of the patent.

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II. Attorney's Fees and Costs.

/3/ Under 35 U.S.C. sec. 285,⁸ the district court may award reasonable attorney's fees to the prevailing party in "exceptional" patent cases. This award is within the discretion of the trial court. Appellate courts do not countermand that discretion unless it has been abused on the part of the trial judge. Purer & Co. v. Aktiebolaget Addo, 410 F.2d 871 (9th Cir.) cert. denied, 396 U.S. 834, 90 S.Ct. 90, 24 L.Ed.2d 84 (1969); Shingle Products Patents, Inc. v. Gleason, 211 F.2d 437, 441 (9th Cir. 1954).

/4/ The trial court's discretion in awarding attorney's fees in patent cases may be invoked only upon a finding of bad faith or unequitable conduct on the part of the losing party which would make it grossly unjust for the

prevailing party to be left with the burden of his litigation expenses. Purer & Co. v. Aktiebolaget Addo, supra; Rohr Aircraft Corporation v. Rubber Teck, Inc., 266 F.2d 613, 624 (9th Cir. 1959); Park-In Theaters, Inc. v. Perkins, 190 F.2d 137, 142 (9th Cir. 1951).

In the case before us, the district court found that the conduct of the plaintiffs amounted to bad faith and that it "would be unconscionable to require the defendants to bear the burden of their defense cost." Maurice A. Garbell Inc. v. Boeing Co., 385 F.Supp. at 38 (Finding N17). Specifically, the court found that Garbell had misled the patent office by suppressing relevant evidence of prior publications, 385 F.Supp. at 38 (Findings N13-N15, N17), and that he did not make a reasonable assessment of the possibilities of infringement before bringing suit (Finding N16).

/5,6/ The patent applicant owes a duty to the patent office to make a full and fair disclosure of all facts which may affect the patentability of his invention. Precision Instruments Manufacturing Co. v. Automotive Maintenance Machinery Co., 324 U.S. 806, 818, 65 S.Ct. 993, 89 L.Ed. 1381 (1945). A breach of that duty is relevant not only in determining the validity of the patent but also the good faith of the applicant in maintaining subsequent infringement actions. Monolith Portland Midwest Co. v. Kaiser Aluminum and Chemical Corp., 407 F.2d 288 (9th Cir. 1969); United States v. Barker, 514 F.2d 1077 (2d Cir. 1975).

/7/ While the district court noted that the conduct of the plaintiffs may not have amounted to fraud, it "was below the standards of good faith and candor required by inventors dealing with the Patent Office." Maurice A. Garbell Inc. v. Boeing Co., 385 F.Supp. at 38 (Finding N15). This finding of bad faith is an adequate foundation for deciding that this case is exceptional within the meaning of 35 U.S.C. sec. 285. Monolith Portland Midwest Co. v. Kaiser Aluminum and Chemical Corp., supra; Shelco Inc. v. Dow Chemical Co., 466 F.2d 613 (7th Cir. 1972); Kahn v. Dynamics Corp. of America, 508 F.2d 939 (2d Cir. 1974); cert. denied, 421 U.S. 930, 95 S.Ct. 1657, 44 L.Ed.2d 88 (1975).

/8/ The additional finding that the patentee did not make a reasonable assessment of the possibilities of infringement before bringing suit lends further support to the conclusion that this case was "exceptional". Talon Inc. v. Union Slide Fastener, Inc., 266 F.2d 731 (9th Cir. 1959); Kaehni v. Diffraction Co., 342 F.Supp. 523, 526 (D.C., Md. 1972).

We have also noted that the record is replete with circumstantial evidence of intransigence and vexatious behavior by the plaintiffs which ran up the costs. The trial court's findings of bad faith are supported by the record and are not clearly erroneous. We agree with the trial court that this is an "exceptional" case which justifies the

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award of attorney's fees under 35 U.S.C. sec. 285.

/9/ The award of \$237,062.50 in attorney's fees is one of the largest reported awards under 35 U.S.C. sec. 285. However, in light of the extraordinary length of time (ten years) that was consumed by these proceedings and the necessarily great number of hours expended on behalf of defendants by their counsel,¹⁰ we cannot say that this award is excessive or unreasonable.

Appellants have sought to make a point of some of the colloquy on the part of the trial judge which indicated the strength of the judge's feelings about the antecedent behavior of some of the appellants. While the judge expressed himself forcefully, and perhaps thereby added unneeded fuel to the appellants' displeasure, we cannot say that the colloquy reveals bias or prejudice. The trial judge's somewhat scathing remarks were not surprising in light of the provocation, even though, upon more mature reflection, he might have delivered substantially the same message in softer language.

/10/ Finally, the award of costs to the defendants in the amount of \$51,843.03 was also within the discretion

of the trial court and entirely proper. Fed.R.Civ.P.54(d); 28 U.S.C. sec. 821; 28 U.S.C. sec. 1920.

The judgment of the district court is affirmed in all respects.

FOOTNOTES

* (at 546 F.2d 297, 298, appearing at page "Appendix B2" of this reprint).

The Honorable William G. East, United States Court District Judge for the District of Oregon, sitting by designation.

1. (at 546 F.2d 297, 298, appearing at page "Appendix B-2" of this reprint).

Maurice A. Garbell Inc. v. Boeing Co., 385 F.Supp. 1 (C.D.Cal.1973).

2. (ibid.)

"Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title."

3. (ibid.)

"A person shall be entitled to a patent unless -(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for the patent * * *."

4. (at 546 F.2d. 297, 298, appearing at page "Appendix B-3" of this reprint).

"A person shall be entitled to a patent unless - * * * (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of the application for the patent in the United States * * *."

5. (ibid.)

"A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains * * *."

6. (ibid.)

"The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is mostly nearly connected, to make and use the same, and shall set forth the best mode contemplated by the inventor of carrying out his invention * * *."

7. (ibid.)

A more detailed description of the technical features of the proposed wing design and the state of the prior art is contained in the district

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court's opinion. Maurice A. Garbell Inc. v. Boeing Co., 385 F.Supp. 1 (C.D.Cal.1973).

8. (at 546 F.2d 297, 300, appearing at page "Appendix B-4" of this reprint).

"The court in exceptional cases may award reasonable attorney fees to the prevailing party"

9. (at 546 F.2d 297, 300, appearing at page "Appendix B-5" of this reprint).

Because we held that these findings adequately support the award of attorney's fees, we express no opinion on the alternate grounds relied upon by the district court.

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10. (at 546 F.2d 297, 301, appearing at page "Appendix B-6" of this reprint).

These proceedings began in 1963 and took over ten years to complete, even excluding the time consumed by this appeal. The court found that counsel for the defendants reasonably expended 18,525 hours on this case.

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End

- Appendix B-9 -

APPENDIX C

ORDER OF THE
UNITED STATES COURT OF APPEALS
FOR THE NINTH CIRCUIT

Filed December 28, 1976

Denying Petition for Rehearing.

(Marked: "Filed Dec 28 1976 Emil C. Melfi, Jr.
Clerk, U.S. Court of Appeals")

UNITED STATES COURT OF APPEALS
FOR THE NINTH CIRCUIT

MAURICE A. GARBELL, INC., a California)
corporation, et al., Appellants,)
v.)
THE BOEING COMPANY, a Delaware corporation,)
Appellee,)

MAURICE A. GARBELL, INC., a California)
corporation, et al., Appellants,)
v.)
McDONNELL DOUGLAS CORPORATION,)
Appellee.)

No. 74-1017

ORDER

Appeal from the United States District Court
for the Central District of California

Before: GOODWIN and SNEED, Circuit Judges, and
EAST,* District Judge.

The panel as constituted in the above-numbered case has voted to deny the petition for rehearing. Judges Goodwin and Sneed have voted to reject the suggestion for a rehearing en banc, and Judge East has recommended rejection of the suggestion for rehearing en banc.

The full court has been advised of the suggestion for en banc rehearing, and no judge of the court has requested a vote on the suggestion for rehearing en banc. Fed. R. App. P. 35(b).

The petition for rehearing is denied and the suggestion for a rehearing en banc is rejected.

*The Honorable William G. East, Senior United States District Judge for the District of Oregon, sitting by designation.

PROOF OF SERVICE.

I, George B. White, attorney for Maurice A. Garbell, Inc., and the Garbell Research Foundation, Petitioners herein, and a member of the Bar of the Supreme Court of the United States, hereby certify that, on the 13th day of April 1977, I served copies of the foregoing Appendices A, B, and C to the Petition for a Writ of Certiorari to the Supreme Court of the United States, as identified on the cover hereof, on the several parties thereto, as follows:

1. On The Boeing Company, Defendant, by mailing three copies in a duly addressed envelope, with first-class postage prepaid, to its attorneys,

PERKINS, COIE, STONE, OLSEN & WILLIAMS,
J. PAUL COIE,
1900 Washington Building,
Seattle, Washington, 98101.
(206) 682-8770

2. On the McDonnell-Douglas Corporation, Defendants, by mailing three copies in a duly addressed envelope, with first-class postage prepaid, to its attorneys,

LOUIS LIEBER, JR.,
WALTER J. JASON,
3000 Ocean Park Boulevard,
Santa Monica, California 90405.
(213) 399-9311, Extension 4275.

3. On The Boeing Company and the McDonnell-Douglas Corporation, Defendants, by mailing three copies in a duly addressed envelope, with first-class postage prepaid, to their attorneys,

HAHN, CAZIER, THORNTON, HOEGH & LEFF,
RICHARD B. HOEGH,
RUSSELL P. KUHN,
Crocker Citizens Plaza,
611 West Sixth Street, Fourteenth Floor,
Los Angeles, California 90017.
(213) 628-6151.

It is further certified that all parties required to be served have been served.

George B. White

George B. White,
Attorney for Petitioners,
806 Grant Building,
1095 Market Street,
San Francisco, California 94103.
(415) 621-7065.

OCTOBER TERM, 197__

No. **76-1425**

MAURICE A. GARBELL, INC.,
and
GARBELL RESEARCH FOUNDATION
Petitioners,

v.

THE BOEING COMPANY,
Respondent.

and

MAURICE A. GARBELL, INC.,
and
GARBELL RESEARCH FOUNDATION
Petitioners,

v.

McDONNELL-DOUGLAS CORPORATION,
Respondent.

**PETITION FOR WRIT OF CERTIORARI
to the United States Court of Appeals
for the Ninth Circuit**

**APPENDIX D
THE PATENT IN SUIT**

George B. White
806 Grant Building
1095 Market Street
San Francisco, Calif. 94103
(415) 621-7065
Counsel for Petitioners

March 22, 1977.

In the Supreme Court

OF THE
United States

OCTOBER TERM, 197__

No. _____

MAURICE A. GARBELL, INC.,
and
GARBELL RESEARCH FOUNDATION
Petitioners,

v.

THE BOEING COMPANY,
Respondent.

and

MAURICE A. GARBELL, INC.,
and
GARBELL RESEARCH FOUNDATION
Petitioners,

v.

McDONNELL-DOUGLAS CORPORATION,
Respondent.

**PETITION FOR WRIT OF CERTIORARI
to the United States Court of Appeals
for the Ninth Circuit**

**APPENDIX D
THE PATENT IN SUIT**

George B. White
806 Grant Building
1095 Market Street
San Francisco, Calif. 94103
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Counsel for Petitioners

March 22, 1977.

May 18, 1948

M. A. GARBELL

2,441,758

FLUID-FOIL LIFTING SURFACE

Filed July 16, 1946

3 Sheets-Sheet 1

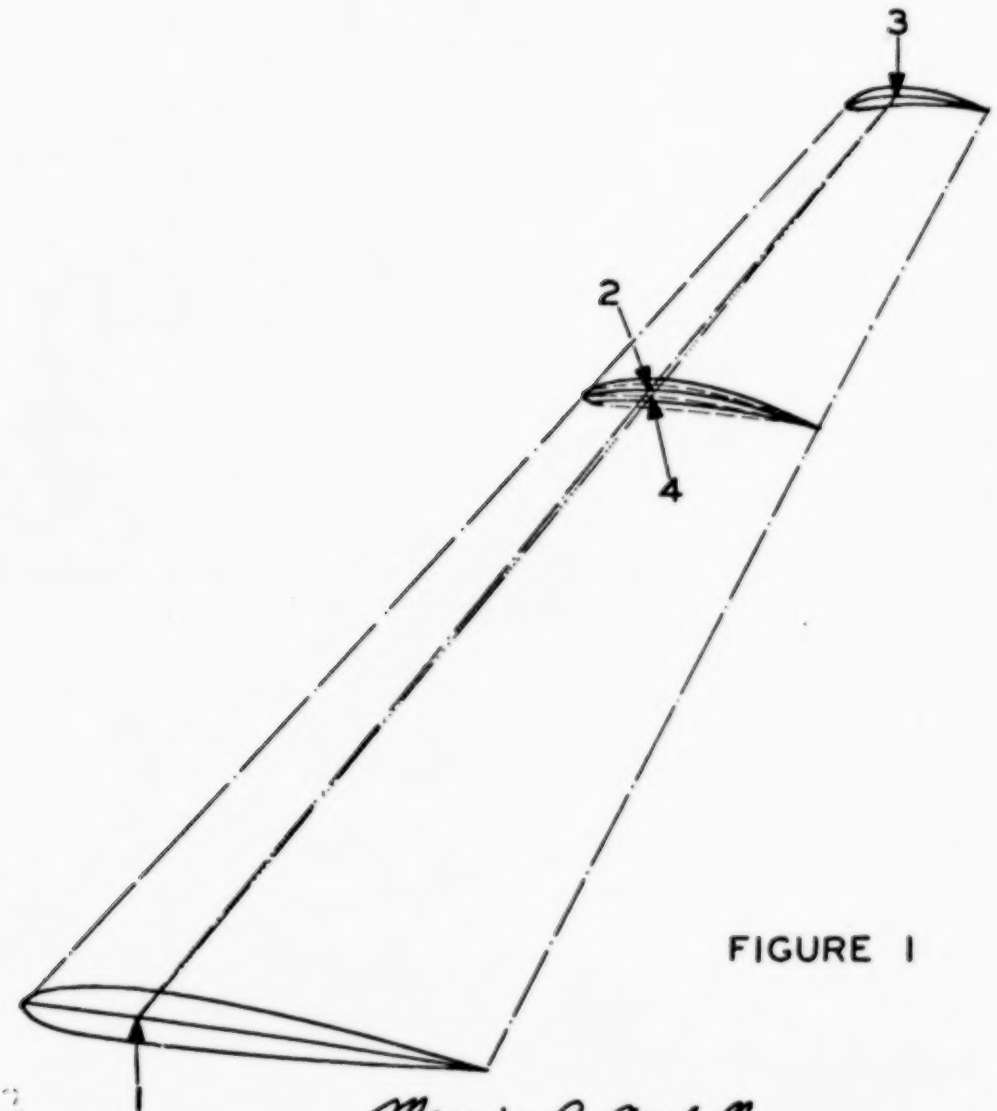


FIGURE 1

Maurice A. Garbell INVENTOR.

BY *Weyl and Luecke*
ATTORNEYS

May 18, 1948

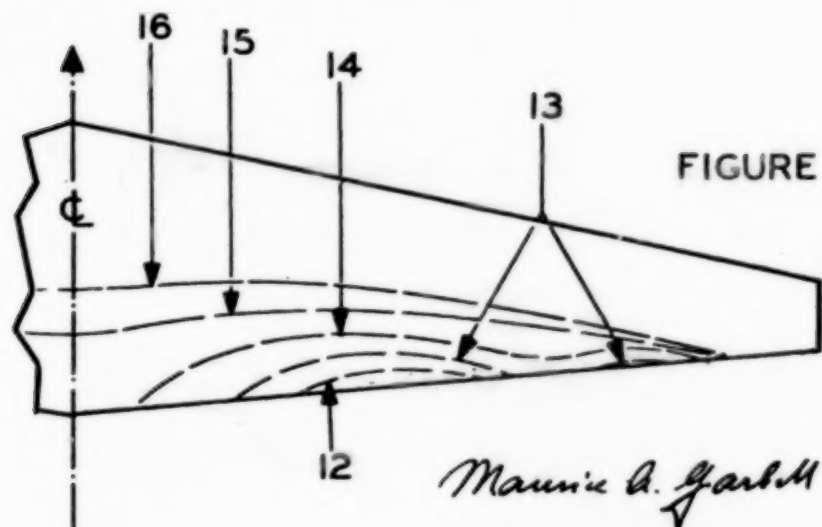
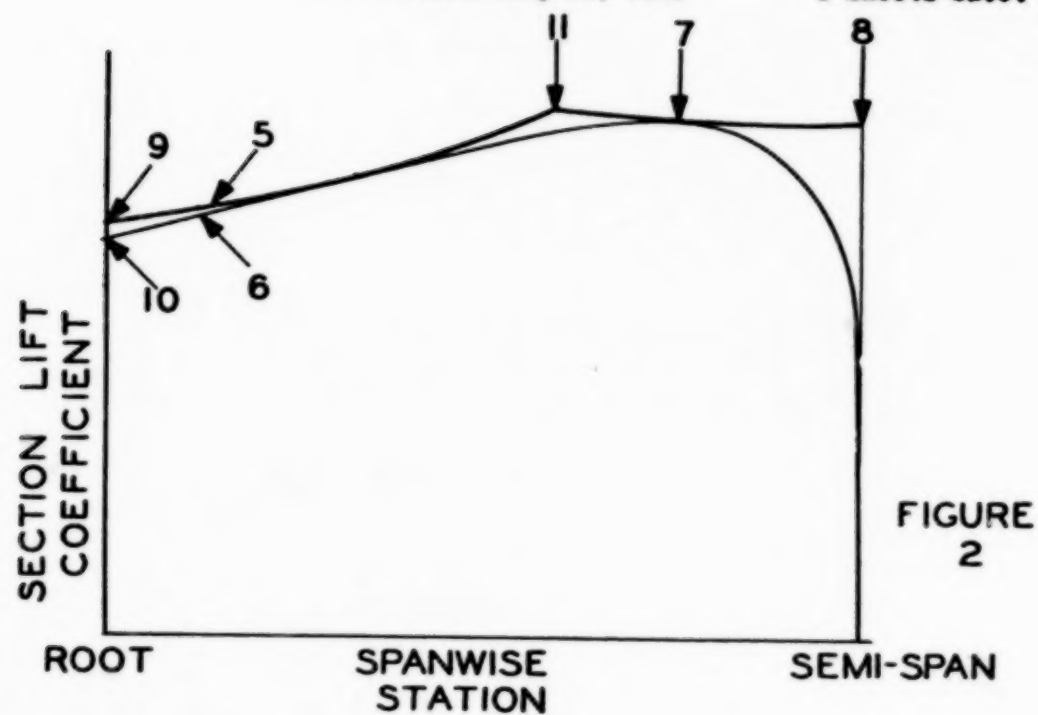
M. A. GARBELL

2,441,758

FLUID-FOIL LIFTING SURFACE

Filed July 16, 1946

3 Sheets-Sheet 2



Maurice A. Garbell INVENTOR.

BY *Hayler and Lescage*
ATTORNEYS

May 18, 1948

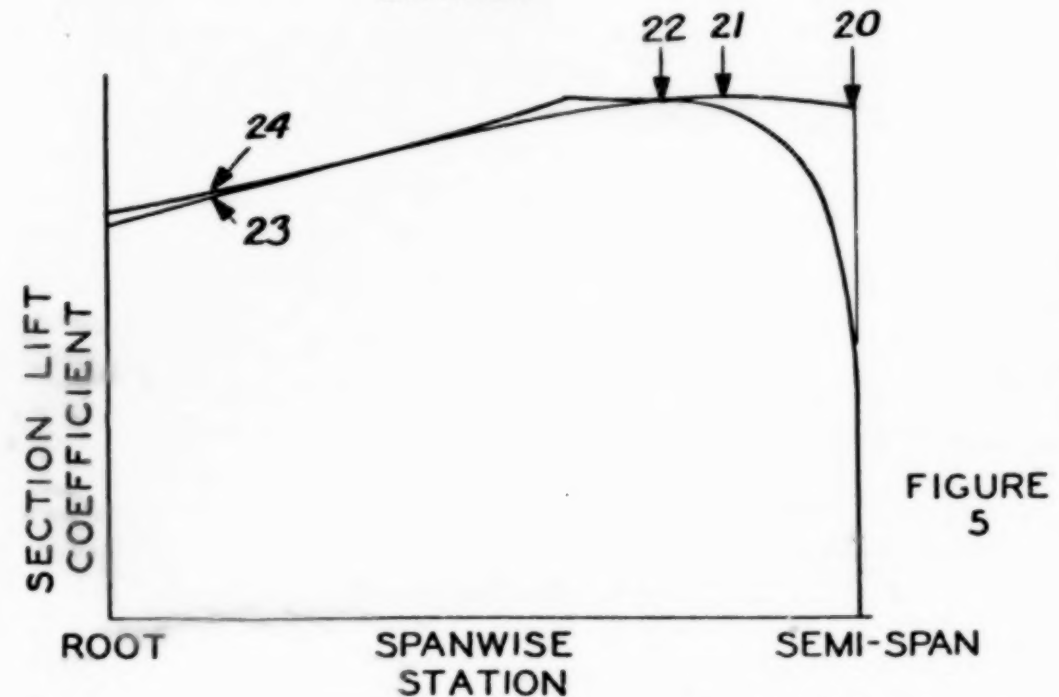
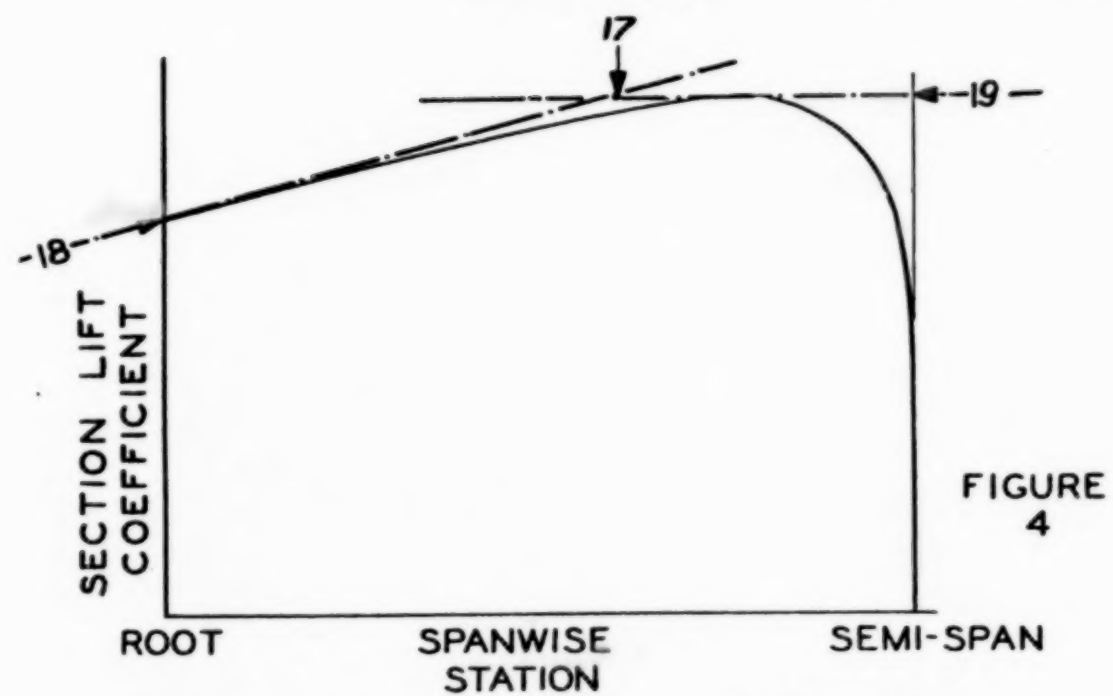
M. A. GARBELL

2,441,758

FLUID-FOIL LIFTING SURFACE

Filed July 16, 1946

3 Sheets-Sheet 3



Maurice A. Garbell INVENTOR.

BY *Hayler and Lescage*
ATTORNEYS

Patented May 18, 1948

2,441,758

UNITED STATES PATENT OFFICE

2,441,758

FLUID-FOIL LIFTING SURFACE

Maurice Adolph Garbell, San Francisco, Calif.,
assignor to Maurice A. Garbell, Inc., San Francisco, Calif., a corporation of California

Application July 16, 1946, Serial No. 683,815

15 Claims. (Cl. 244—35)

1

This invention relates to the design and construction of surfaces to be driven through a fluid, intended to produce a useful force component perpendicular to the relative velocity of the fluid with respect to the surface, known in the art as "lift force," "side force," etc., and referred to hereinafter as "lift." 5

1

In particular this invention relates to the design and construction of surfaces to be driven through the air, intended to produce an aerodynamic lift force perpendicular to the relative wind velocity with respect to the said surface, while minimizing the aerodynamic drag force parallel to the relative wind. In the art such surfaces are known as "wings," "fins," "blades," etc., and will be referred to hereinafter as "lifting surfaces." The closed curves resulting from intersections of the lifting surfaces with vertical planes parallel to the relative wind will be referred to hereinafter as "fluid-foil sections." The body to which the lifting surface is fastened will be referred to hereinafter as the "craft." 10 15 20

Figure 1 illustrates the preferred embodiment of this invention comprising a lifting surface designed and constructed according to the method outlined in the subject specification. 25

Figure 2 illustrates the spanwise distribution of actually prevailing section lift coefficients and the spanwise distribution of maximum attainable section lift coefficients on a typical lifting surface designed and constructed according to the subject method of this invention. 30

Figure 3 illustrates the typical inception and growth of the stall of a lifting surface designed and constructed according to the subject method of this invention. 35

Figure 4 illustrates the procedure employed in the finding of the optimum spanwise location of the third controlled fluid-foil section in a lifting surface designed and constructed according to the subject method of this invention. 40

1

Figure 5 illustrates the spanwise distribution of actually prevailing section lift coefficients and the spanwise distribution of maximum attainable section lift coefficients on a typical lifting surface designed and constructed according to the subject method of this invention, the tip section of said lifting surface having a thickness ratio smaller than the optimum thickness ratio for absolutely maximum attainable section lift coefficient for the series of fluid-foils employed in the lifting surface.

The general object of this invention is the attainment of good stalling characteristics of lifting surfaces, said good stalling characteristics being achieved by the employment of three or

2

more controlled fluid-foil sections 1, 2, and 3, selected according to the method explained in the subject specification of this invention, wherein section 2, representing the additional controlled sections interjacent between the root and the tip of the lifting surface, is at variance with the section 4 obtainable at the respective spanwise stations by means of straight-line fairing between the fluid-foil sections located at the root and the tip of the lifting surface.

Another object of this invention is the elimination of the violent rolling moments ordinarily produced by the unavoidable asymmetry of the stalling process, because the aforementioned method of fluid-foil selection suppresses the stall inception at the tip of the lifting surface and induces stall inception at a more inwardly located panel of the lifting surface, thus reducing the rolling moments acting on the craft for a

2

given asymmetry of lift forces on the two stalled lifting surfaces.

Another object of this invention is the maintenance of adequate lateral-control effectiveness, together with the elimination of violent unstable control forces acting on control surfaces and devices attached to the trailing edge of the tip panel, during the critical stall-inception stage of the lifting surface, because the aforementioned method of fluid-foil selection induces stall inception at a more inwardly located panel of the lifting surface, so that the fluid flow over the tip panel and hence over the said control surfaces and devices remains smooth, thus maintaining effective lateral control as well as stable and smoothly varying control forces throughout the stall of the lifting surface.

Another object of this invention, through the employment of the aforementioned method of fluid-foil selection, is to reduce both the parasite drag and the induced drag of the unstalled lifting surface, and to shift the spanwise location of the "center of drag forces" of the stalled lifting surface inwardly so that the drag moment of the stalled lifting surface with respect to a vertical axis at or near the root is reduced to a value smaller than that of a lifting surface having a stall inception near the tip thereby reducing to a minimum the power required to maintain the rotation of partially or totally stalled lifting surfaces of the "rotating-wing" or "rotating-blade" type.

Additional objects of this invention will appear hereinafter.

In the art the achievement of the objects of this invention is recognized as one of the great steps in advancing safety and efficiency in air-

craft design. According to accident statistics of the Civil Aeronautics Boards and other aeronautical agencies most flying accidents, especially those accidents occurring while flying in proximity of the ground, during take-off, and when landing, are caused by the stall of the lifting surface, the severity of such accidents being attributable not so much to the loss of lift directly, as indirectly to the adverse longitudinal and lateral stability characteristics, to the loss of control effectiveness, and to the violent unstable control forces produced by the stall inception near the tip of the lifting surface.

An investigation of the fundamental reasons for unsatisfactory and hazardous stalling characteristics reveals that high plan-form taper and sweep-back of the lifting surface create three principal unfavorable effects resulting in a stall inception near the tip of the lifting surface: (1) a reduction of the scale factor known in the art as "Reynolds number" in direct proportion to the decrease of chord length from the root to the tip; according to well-known experimental evidence the maximum section lift coefficient attainable with a given fluid-foil section placed in the tip panel of the lifting surface is smaller than the maximum section lift coefficient that the same section would be capable of attaining were it placed in the root panel where the chord length and hence the Reynolds number are greater; (2) a deviation from the ideal "elliptical span-load distribution" tending to increase the lift coefficients prevailing over the tip sections and to reduce the lift coefficients prevailing over the root sections at any given total lift coefficient of the lifting surface; (3) an outwardly directed spanwise fluid cross-flow, especially on the suction side

of the lifting surface; this cross-flow at high lift coefficients of the lifting surface in an additional incentive for fluid-flow separation and stall near the tip of the lifting surface.

In the art, prior to this invention, it was customarily sought to counteract the aforementioned factors that contribute to the stall inception in the tip panel by resorting to the following measures: (a) effective washout, that is, washout of the zero-lift line of the fluid-foil section at the tip with respect to the zero-lift line of the root section, thus reducing the effective angle of attack of the tip section below the effective angle of attack of the root section; (b) the employment of a fluid-foil section with a more highly cambered mean line at the tip of the lifting surface than at the root, in order to enable the tip section to attain higher maximum section lift coefficients.

These measures, however, have not been entirely successful in suppressing the stall inception near the tip of the lifting surface; the spanwise distribution of the actually prevailing section lift coefficients reaches a peak near the tip and therefore inevitably intersects the nearly linear spanwise distribution of maximum attainable section lift coefficients in this most critical portion of the lifting surface.

As a rule the resulting stall patterns remain unsatisfactory for all but the lowest of plan-form taper ratios, and may become dangerously critical for plan-form taper ratios in excess of 3:1 and for any highly swept-back lifting surfaces. The stall inception in the vicinity of the tip of the lifting surface and a comparatively slow inboardward progression of the stall with any further increase of the angle of attack of the lifting surface results in the most vicious type of tip stall, with

little or no stall warning, violent rolling moments, loss of lateral control, violent unstable control forces, and unstable nose-up pitching moments throughout the stall.

5 It was therefore customary in the art, prior to this invention, to employ as much washout and camber variations as was deemed permissible, and to transfer the further responsibility for the avoidance of the admittedly unsatisfactory
10 stalling characteristics to the care of the pilots, or to warning signals actuated by the stalled fluid flow, or to a limitation of the elevator control travel to prevent the attainment of the high angles of attack at which stall occurs.

15 Techniques utilizing three controlled fluid-foil sections, in which the section at the semi-span center has either greater or smaller mean-line camber than the sections at the root and tip, have also failed to offer any substantial improvement
20 of the dangerous tip-stall characteristics of highly tapered and/or swept-back lifting surfaces.

A preferred embodiment of this invention is described in the following specification; the
25 broad scope of the invention is expressed in the claims concluding the instant application.

The invention consists of novel methods and combinations of methods described hereinafter, all of which contribute to produce a safe and efficient lifting surface.
30

Figure 1 illustrates the preferred embodiment of this invention, comprising a lifting surface with three or more "controlled" fluid-foil sections, in which the section with the least mean-line camber 1 is located at the root of the lifting surface, the section with the greatest mean-line
35 camber 3 is located at the fluid-dynamically ef-

fective tip of the lifting surface (the actual tip fairing of the lifting surface may comprise a
40 faired three-dimensional body without any identifiable mean-line camber, which is not of any consequence in the application of the subject invention), and one or more interjacent fluid-foil sections 2 are selected following the method
45 outlined below, said interjacent fluid-foil sections having values of the mean-line camber at variance with the values 4 obtainable at the respective spanwise stations by means of straight-line fairing between the fluid-foil section located
50 at the root and the fluid-foil section located at the tip of the lifting surface, provided that the respective values of the mean-line camber of the interjacent fluid-foil sections neither exceed the mean-line camber of the tip section nor
55 fall below the mean-line camber of the root section. It shall be understood that the preceding considerations apply to all types of lifting surfaces regardless of the respective thickness ratios of the root and tip sections. It shall also
60 be understood that additional considerations relative to the respective thickness ratios of the various controlled fluid-foil sections are presented herein for lifting surfaces wherein the thickness ratio of the root section is the greatest,
65 and the thickness ratio of the tip section is the smallest, respectively, of any fluid-foil section employed in the lifting surface.

Figure 2 illustrates the preferred manner in which this invention, through the employment
70 of the aforementioned method of fluid-foil selection, achieves the establishment of a curvilinear polygon 5 describing the spanwise distribution of maximum attainable section lift coefficients, said curvilinear polygon being so shaped that
75 it envelops closely the curve 6 describing the

spanwise distribution of the actually prevailing section lift coefficients, except that beyond the spanwise point 7 at which the highest actually prevailing section lift coefficient occurs the maximum attainable section lift coefficient exceeds substantially the actually prevailing section lift coefficient, so that the stall inception occurs near mid-semispan, spreads more prevalently inboardward and to a smaller extent outboardward, and does not involve the extreme tip of the lifting surface prior to the breakdown of the fluid flow over the entire remaining lifting surface.

As used herein the curvilinear polygon 5 describing the spanwise distribution of maximum attainable section lift coefficients is established by the respective values of the maximum attainable lift coefficients of the root section 9, the tip section 8, and the third or additional control section 11, and by the respective maximum attainable lift coefficients 5 of the sections obtained by conventional fairing between each pair of controlled sections 9—11, 11—8, etc.

The curve 6 describing the spanwise distribution of the actually prevailing section lift coefficients at the maximum lift coefficient of the lifting surface is obtained by conventional methods of experimentally verified calculation for the desired lifting surface, taking into consideration the plan-form, effective aerodynamic washout, section lift-curve-slope characteristics, etc.

The term "envelopment" as used herein signifies the establishment of curvilinear polygon 5 on the convex side of curve 6, wherein each individual branch 9—11, 11—8, and so forth of the curvilinear polygon 5 is tangent or nearly tangent to curve 6.

Figure 3 illustrates the stall progression re-

sulting from the employment of the subject method of this invention. The curves 12, 13, 14, 15, and 16 indicate, in their orderly progression, the extent of the stalled lifting-surface area at angles of attack greater than the angle of attack at which stall inception 12 first occurs. This spanwise far-reaching yet gradual spread of the stalled area prevents the formation of a deep local stall in a chordwise or depthwise sense at any one spanwise station. Steep spanwise pressure differences between unstalled sections and stalled sections, and hence deep spanwise cross-flows, are thereby effectively prevented.

The prevalently inboardward development of the stalled area not only produces the desired timely stall warning in the form of a gentle tail shake at a speed slightly in excess of stalling speed, but serves also to reduce the downwash of the fluid flow aft of the lifting surface in the space usually occupied by the horizontal stabilizer, so that an upwardly directed lift-force increment is made to act on the horizontal stabilizer, thereby imposing a nose-down pitching moment on the craft that induces the craft to return to smaller angles of attack and brings to a halt any further progress and intensification of the stalling process by precluding any increase in angle of attack beyond the stalling angle.

The following specification outlines the method employed in the design of the subject lifting surface of this invention, whereby to select the most opportune values of fluid-foil section mean-line camber and fluid-foil section thickness ratio required to achieve the objects of the instant invention:

To apply the subject method of this invention it is actually necessary to know only the plan form of the lifting surface and the desired stall

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pattern. Inasmuch as practical considerations other than those pertaining solely to the control of the stalling characteristics ordinarily predetermine certain design parameters of the lifting surface, preferred embodiments of the subject method of this invention are hereinafter explained for two typical combinations of predetermined basic design parameters:

In the first typical configuration the following design parameters, for example, are assumed to be given a priori: (a) the plan form of the lifting surface, based on structural and practical design considerations; (b) the series of fluid-foil sections to be employed, based on high-speed and other performance requirements; (c) the maximum permissible effective aerodynamic washout, based on drag considerations and structural bending-moment limitations; (d) the thickness ratio of the fluid-foil section at the root, based on the critical-Mach-Number requirements and structural weight considerations; (e) the thickness ratio of the fluid-foil section at the tip, based on practical space requirements for control-surface balances, etc.; (f) the mean-line camber of the fluid-foil section at the tip, based on the requirement of adequate torsional lifting-surface stiffness at high speed.

The subject method of this invention is employed firstly to design the lifting surface without any effective aerodynamic washout, that is, with the three or more controlled fluid-foil sections placed at such an angle of incidence with respect to the reference chord plane of the lifting surface that the said fluid-foil sections operate at their respective zero-lift angles of attack when the entire lifting surface operates at its angle of attack for zero overall lift.

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Based on fundamental experimental wind-tunnel data available for the pre-selected series of fluid-foil sections, graphs are plotted showing the variation in the maximum attainable section lift coefficient versus the mean-line camber, thickness ratio, and Reynolds number, respectively; similar graphs are plotted showing the variation in the section zero-lift angle of attack versus the mean-line camber, thickness ratio, and Reynolds number, respectively.

The approximate maximum attainable lift coefficient of the entire lifting surface for appropriate values of the Reynolds number is estimated, for example, by dividing the maximum attainable section lift coefficient of the tip section 8 (obtained from the aforementioned wind-tunnel data) by the highest spanwise value of the "additional section lift coefficient

$$C_{l_{\sigma_1}}$$

(as defined in Army-Navy-Commerce ANC-1(1) entitled "Spanwise Air-Load Distribution"), as follows:

$$C_{L_{\max}} = \frac{C_{l_{\max \text{ tip}}}}{C_{l_{\sigma_1 \text{ highest}}}}$$

this equation yields that lift coefficient of the entire lifting surface at which the most highly loaded section 7 carries a section lift coefficient substantially equal to the maximum attainable section lift coefficient 8 of the fluid-foil section employed at the tip.

The spanwise distribution 6 of the actually prevailing section lift coefficients is then calculated for the maximum lift coefficient $C_{L_{\max}}$ of the entire lifting surface, following one of the conventional calculation methods, for example,

the method outlined in the Army-Navy-Commerce Manual ANC-1(1).

For the Reynolds number and the pre-selected thickness ratio of the root section, the required value of mean-line camber is determined from the graph showing the experimentally determined variation of the maximum attainable section lift coefficient with varying mean-line camber, selecting that value of the mean-line camber that produces a maximum attainable section lift coefficient 9 equal to or slightly superior to the section lift coefficient 10 actually prevailing over the root section.

For the spanwise location of the third and additional controlled sections 2 and 11, the subject method of this invention utilizes preferring locations between the spanwise point of the highest actually prevailing section lift coefficient 7 and the root 10 of the lifting surface; the most efficient interval wherein to locate the third controlled section lies between the spanwise point of the highest actually prevailing section lift coefficient 7 and the spanwise point located twice as distantly from the tip as point 7, with a preferable optimum at the point 17, where the tangent to the inboard portion of the curve of spanwise distribution of the actually prevailing section lift coefficients 18 intersects the horizontal tangent 19 to the same curve, as shown in Figure 4.

It will be understood, however, that inescapable practical design considerations may require that the additional controlled sections 2 and 11 be placed at spanwise stations located inside power plant nacelles or at those spanwise stations where the lifting surface is mechanically jointed for sudden changes in plan-form taper, or sweep-back, as is the case in craft with removable or foldable outboard panels.

The Reynolds number is calculated for the third controlled section; the thickness ratio obtainable at the third section by straight-line interpolation between the root section and the tip section is also determined. For the Reynolds number and thickness ratio thus determined, the required value of mean-line camber is found from the graph showing the experimentally determined variation of the maximum attainable section lift coefficient with varying mean-line camber, selecting that value of the mean-line camber which produces a maximum attainable section lift coefficient 11 and 17 equal to or slightly superior to the highest actually prevailing section lift coefficient 7.

From the foregoing, it will be readily seen that the lifting surface obtained by the invention, and defined by the curvilinear polygon 5, embodies the combination of an airfoil section 1 or 9 having the smallest mean line camber at the root, an airfoil section 3 or 8 having the greatest mean line camber at the tip, and one or more interjacent controlled sections 2 or 11, having values of the mean line camber at variance with the values 4 obtainable at the respective spanwise stations by means of straight line fairing between the root section and the tip section.

If the required maximum attainable section lift coefficient for the interjacent section 11 cannot be obtained with a mean-line camber not exceeding the mean-line camber of the tip section, a value equal to or slightly less than the mean-line camber of the tip section is selected. The maximum attainable section lift coefficient of the interjacent section is then increased by changing the section thickness ratio in the proper sense, usually downward, until either the required

maximum attainable section lift coefficient 11 is obtained, or until structural considerations interfere with the continuance of this procedure. If this process does not offer a conclusive result, which is rare; a small amount of effective aerodynamic washout is then introduced, $\frac{1}{2}^\circ$ to 1° in each step of the application of the method, wherein the total effective aerodynamic washout is distributed in appropriate fashion between the controlled sections and where the total washout is less than the maximum permissible washout as defined in the aforelisted initial design assumptions. The entire heretofore specified procedure including the establishment of a curve 6 conforming to the washout chosen, is then repeated for the selected amount of effective aerodynamic washout, until the desired results as illustrated in Figures 2 and 3 are attained.

A typical example of the application of the principles of this invention to one well-known type of lifting surface is as follows; Here we assume a planform taper ratio of three to one, an aspect ratio of ten, a total effective aerodynamic washout of zero degrees, a constant section thickness ratio of twelve per cent along the entire semi-span, the utilization of "64—" series NACA "low-drag" fluid-foil sections, a mean-line camber of the root section 1 characterized by an "ideal lift coefficient" C_{li} equal to 0.1, and a mean-line camber of the tip section 3 characterized by an "ideal lift coefficient" C_{li} equal to 0.45. The term "ideal lift coefficient" is to be interpreted as defined by the National Advisory Committee for Aeronautics nomenclature and is herein used as a parameter characteristic of the mean line camber of a fluid foil section. Calculations based on conventional methods will indicate that a lifting surface having the above

general design parameters will experience, at its maximum resultant lift coefficient, a distribution of section lift coefficients as illustrated in curve 6.

Following the procedures hereinbefore described, we achieve in the above-outlined construction the desirable stalling characteristics taught by this invention through the use of a controlled fluid-foil section 2 or 11 at a station approximately 55 per cent of the semi-span from the root and with an effective aerodynamic washout of zero degrees with respect to the root section, wherein the mean-line camber of the interjacent controlled section 2 or 11 is characterized by an "ideal lift coefficient" C_{li} equal to 0.35. In this structural example the mean-line camber of the interjacent controlled section 2 or 11 is greater than that of the root section 1 or 9; smaller than that of the tip section 3 or 8, and greater than that of the interpolated section 4 obtainable at the 55-per-cent semi-span station by means of straight-line fairing between sections 1 and 3, and which accomplishes the envelopment of curve 6 by the curvilinear polygon 5.

In another typical example, a lifting surface is assumed as having substantially identical basic design geometry as the preceding example, except for a structurally desirable root thickness ratio of twenty-three per cent, a tip thickness ratio of seven per cent, a total effective aerodynamic washout of one degree, and a thickness ratio of fifteen per cent at an interjacent station located at approximately 60 per cent of the semi-span.

Again following the procedure of this invention, we achieve in the abovedescribed construction the desirable stalling characteristics taught

by this invention through the use of a controlled fluid-foil section 2 or 11 at the station located approximately 60 per cent of the semi-span from the root and with an effective aerodynamic wash-out of 0.5 degree with respect to the root section, wherein the mean-line camber of the interjacent controlled section 2 or 11 is characterized by an "ideal lift coefficient" C_{l_i} equal to 0.12. In this structural example the mean-line camber of the interjacent controlled section 2 or 11 is greater than that of the root section 1 or 9, smaller than that of the tip section 3 or 8, and smaller than that of the interpolated section 4 obtainable at the 60-per-cent semi-span station by means of straight-line fairing between sections 1 and 3, and which accomplishes the envelopment of curve 6 by the curvilinear polygon 5.

(2) The second typical configuration differs from the first in that the thickness ratio of the tip section 3 is not predetermined. Hence, the following design parameters are assumed to be given a priori: (a) the plan form of the lifting surface; (b) the series of fluid-foil sections to be employed and their fluid-dynamic characteristics; (c) the maximum permissible effective aerodynamic washout; (d) the thickness ratio of the fluid-foil section at the root; (e) the mean-line camber of the fluid-foil section at the tip.

In this case where the thickness ratio of the tip section is not predetermined but is left to the judgment of the fluid-dynamical design engineer, the subject method of this invention employs to good advantage a peculiarity observed in the variation of the maximum attainable section lift coefficient with varying section thickness ratio. Most series of related fluid-foil sections reach their absolutely highest maximum

section lift coefficient (for a given mean-line camber and Reynolds number) at a certain experimentally determined thickness ratio, usually between 12% and 16%. Sections with thickness ratios greater or smaller than optimum attain less than the absolutely maximum section lift coefficient. If, as illustrated in Figure 5, a thickness ratio smaller than optimum is used at the tip 20 of a lifting surface, where the actually prevailing section lift coefficients are greatly below their highest spanwise value 22, the fluid-foil section with the optimum thickness ratio can be located at a spanwise station 21 a small distance inboard of the tip, near the spanwise station 22 at which the highest actually prevailing section lift coefficient is encountered. Here it will be understood that the mean-line camber of the interjacent controlled section 2 may be greater or smaller than that of the aforementioned section 4, depending on the range of section thickness ratios encountered between the root and the tip of the lifting surface.

In this case the subject method of this invention is modified to the extent that, in calculating the spanwise distribution of the actually prevailing section lift coefficients 23, the maximum lift coefficient $C_{L_{max}}$ of the entire lifting surface shall be determined not on the basis of the maximum attainable section lift coefficient of the tip section, but on the basis of the absolutely maximum attainable section lift coefficient 21, that is, for the section of optimum thickness ratio, as follows:

$$C_{L_{max}} = \frac{C_{l_{max \text{ abs.}}}}{C_{l_{a1 \text{ highest}}}}$$

The thickness ratio of the fluid-foil section at the

tip of the lifting surface is then so chosen that the section 21 with optimum thickness ratio for absolutely maximum attainable section lift coefficient lies between the spanwise station of
 5 highest actually prevailing section lift coefficient 22 and the tip 20, unless structural and other design criteria interfere by establishing a minimum section thickness ratio.

If the designer intends to achieve positive stall
 10 inception in a certain spanwise panel of the lifting surface, the subject method of this invention provides that in either of the aforescribed design procedures the mean-line camber and thickness ratios, as well as the spanwise location,
 15 of the sections comprised within or adjacent to the panel for which stall inception is desired be so selected that within the "stall inception panel" the curve of maximum attainable section lift coefficients lies slightly below the curve of actually prevailing section lift coefficients, without
 20 modifying the aforescribed relationship of the maximum attainable section lift coefficients and the actually prevailing section lift coefficients on the remainder of the semispan of the lifting surface outside of the "stall-inception panel" proper.
 25

If, in any of the aforescribed cases, the lifting surface under consideration is modified by excrescences such as, for example, power-plant nacelles, or flaps that modify the local zero-lift
 30 angle and the local maximum attainable section lift coefficient, the calculation of the spanwise distribution of the effective washout and the maximum attainable section lift coefficients takes due account of the effects of these modifications by
 35 introducing "equivalent values" of the effective washout and section mean-line camber into the subject method of this invention.

Upon completion of the procedure outlined for the subject method of this invention, the zero-lift angles of the fluid-foil sections selected thusly
 40 are determined for their respective mean-line cambers, thickness ratios, and Reynolds numbers, and each fluid-foil section is set properly with respect to the reference chord plane of the lifting
 45 surface, so that the desired effective washout is achieved.

By practicing my invention a lifting surface can be designed and constructed to achieve the objects heretofore stated.

50 Numerous flight tests and wind-tunnel tests in reputable wind-tunnels such as the California Institute of Technology, the Massachusetts Institute of Technology, the various wind tunnels of the National Advisory Committee for Aeronautics,
 55 and elsewhere have demonstrated convincingly that each of the objects of this invention has been fully achieved. The tests were performed on numerous wing models, on sailplanes, and on models of at least five aircraft designs of widely
 60 varying design scope employing a wide variety of airfoil series. Force-test records, photographic records, and cinematographic records of the tests substantiate the attainment of the objects of this invention.

65 The inventor wishes it to be clearly understood that the greatly improved and generally judged satisfactory stalling characteristics of the wings (and other lifting surfaces) designed and constructed according to the subject method of this
 70 invention are directly attributable to the use of three (or more) controlled fluid-foil sections selected according to the hereinbefore specified method of this invention, and to the aforescribed method employed in the design of such
 75 lifting surfaces.

This invention accomplishes an important improvement in the art, and the discoveries herein disclosed are of great value to all types of aircraft (as well as to craft operating in other fluids), throughout their entire operating range, and especially in the critical low-speed operation where steadiness of lift and lift variation, stability of the craft, control effectiveness, and smoothness and stability of control forces are of vital importance for the safety and efficiency of the craft; also in violent maneuvers at high speeds when high lifting-surface lift coefficients comparable with those occurring at the low-speed stall are encountered and even temporarily surpassed.

I claim:

1 A lifting surface with three or more controlled fluid-foil sections, in which the first section with the smallest mean-line camber is located at the root, the second section with the greatest mean-line camber is located at the fluid-dynamically effective tip, and the third or additional fluid-foil sections are located at stations interjacent between the root and the tip, wherein the values of the mean-line camber of the interjacent fluid-foil sections are greater than the values of the mean-line camber obtainable at the respective spanwise stations by means of straight-line fairing between the fluid-foil section located at the root of the lifting surface and the fluid-foil section located at the tip of the lifting surface.

2. A lifting surface with three or more controlled fluid-foil sections, in which the first section with the smallest mean-line camber is located at the root, the second section with the greatest mean-line camber is located at the fluid-

dynamically effective tip, and the third or additional fluid-foil sections are located at stations interjacent between the root and the tip, wherein the values of the mean-line camber of the interjacent fluid-foil sections are at variance with the values of the mean-line camber obtainable at the respective spanwise stations by means of straight-line fairing between the fluid-foil section located at the root of the lifting surface and the fluid-foil section located at the tip of the lifting surface, said three or more controlled fluid-foil sections having values of the mean-line camber selected in such manner that the resulting spanwise distribution of maximum attainable section lift coefficients of the three or more controlled sections forms a curvilinear polygon enveloping a curve representing the spanwise distribution of section lift coefficients for a given planform actually prevailing at the maximum attainable lift coefficient of the lifting surface.

3. A lifting surface with three or more controlled fluid-foil sections, adapted to provide stall inception within a predetermined interval of spanwise stations in which the first section with the smallest mean-line camber is located at the root, the second section with the greatest mean-line camber is located at the fluid-dynamically effective tip, and the third or additional fluid-foil sections are located at stations interjacent between the root and the tip, wherein the values of the mean-line camber of the interjacent fluid-foil sections are at variance with the values of the mean-line camber obtainable at the respective spanwise stations by means of straight-line fairing between the fluid-foil section located at the root of the lifting surface and the fluid-foil section located at the tip of the lifting surface, said three or more controlled fluid-foil sections hav-

ing values of the mean-line camber selected in such manner that the resulting spanwise distribution of maximum attainable section lift coefficients of the three or more controlled sections forms a curvilinear polygon enveloping a curve representing the spanwise distribution of section lift coefficients actually prevailing at the maximum attainable lift coefficient of the lifting surface, and that the said resulting spanwise distribution of maximum attainable section lift coefficients for a given planform be so shaped that the first intersection with the spanwise distribution of actually prevailing section lift coefficients occurs in that interval of spanwise stations for which stall inception is to be obtained.

4. A lifting surface with three or more controlled fluid-foil sections, in which the first section with the smallest mean-line camber and greatest thickness ratio is located at the root, the second section with the greatest mean-line camber and smallest thickness ratio is located at the fluid-dynamically effective tip, and the third or additional fluid-foil sections are located at stations interjacent between the root and the tip, wherein the values of the thickness ratio of the interjacent fluid-foil sections are greater than the values of the thickness ratio obtainable at the respective spanwise stations by means of straight-line fairing between the fluid-foil section located at the root of the lifting surface and the fluid-foil section located at the tip of the lifting surface.

5. A lifting surface with three or more controlled fluid-foil sections, in which the first section with the smallest mean-line camber and greatest thickness ratio is located at the root, the second section with the greatest mean-line cam-

ber and smallest thickness ratio is located at the fluid-dynamically effective tip, and the third or additional fluid-foil sections are located at stations interjacent between the root and the tip, wherein the values of the thickness ratio of the interjacent fluid-foil sections are at variance with the values of the thickness ratio obtainable at the respective spanwise stations by means of straight-line fairing between the fluid-foil section located at the root of the lifting surface and the fluid-foil section located at the tip of the lifting surface, said three or more controlled fluid-foil sections having values of the thickness ratio selected in such manner that the resulting spanwise distribution of maximum attainable section lift coefficients of the three or more controlled sections forms a curvilinear polygon enveloping a curve representing the spanwise distribution of section lift coefficients for a given planform actually prevailing at the maximum attainable lift coefficient of the lifting surface.

6. A lifting surface with three or more controlled fluid-foil sections adapted to provide stall inception within a predetermined interval of spanwise stations, in which the first section with the smallest mean-line camber and greatest thickness ratio is located at the root, the second section with the greatest mean-line camber and smallest thickness ratio is located at the fluid-dynamically effective tip, and the third or additional fluid-foil sections are located at stations interjacent between the root and the tip, wherein the values of the thickness ratio of the interjacent fluid-foil sections are at variance with the values of the thickness ratio obtainable at the respective spanwise stations by means of straight-line fairing between the fluid-foil section located at the root of the lifting surface and the fluid-

foil section located at the tip of the lifting surface, said three or more controlled fluid-foil sections having values of the thickness ratio selected in such manner that the resulting spanwise distribution of maximum attainable section lift coefficients of the three or more controlled sections forms a curvilinear polygon enveloping a curve representing the spanwise distribution of section lift coefficients actually prevailing at the maximum attainable lift coefficient of the lifting surface, and that the said resulting spanwise distribution of maximum attainable section lift coefficients for a given planform be so shaped that the first intersection with the spanwise distribution of actually prevailing section lift coefficients occurs in that interval of spanwise stations for which stall inception is to be obtained.

7. A lifting surface with three or more controlled fluid-foil sections, in which the first section with the smallest mean-line camber is located at the root, the second section with the greatest mean-line camber is located at the fluid-dynamically effective tip, and one of the interjacent fluid-foil sections is located near a spanwise point where a tangent to the inboard portion of a curve representing the spanwise distribution of actually prevailing section lift coefficients for a given planform intersects a substantially horizontal tangent to the highest point of the same curve, wherein the values of the mean-line camber of the interjacent fluid-foil sections are greater than the values of the mean-line camber obtainable at the respective spanwise stations by means of straight-line fairing between the fluid-foil section located at the root of the lifting surface and the fluid-foil section located at the tip of the lifting surface.

8. A lifting surface with three or more controlled fluid-foil sections, in which the first section with the smallest mean-line camber and greatest thickness ratio is located at the root, the second section with the greatest mean-like camber and smallest thickness ratio is located at the fluid-dynamically effective tip, and one of the interjacent fluid-foil sections is located near a spanwise point where a tangent to the inboard portion of a curve representing the spanwise distribution of actually prevailing section lift coefficients for a given planform intersects a substantially horizontal tangent to the highest point of the same curve, wherein the values of the thickness ratio of the interjacent fluid-foil sections are greater than the values of the thickness ratio obtainable at the respective spanwise stations by means of straight-line fairing between the fluid-foil section located at the root of the lifting surface and the fluid-foil section located at the tip of the lifting surface.

9. A lifting surface with three or more controlled fluid-foil sections and having a highest actually prevailing section lift coefficient at a predetermined spanwise station, in which the first section with the smallest mean-line camber and greatest thickness ratio is located at the root, the second section with the greatest mean-line camber and smallest thickness ratio is located at the fluid-dynamically effective tip, and the third or additional fluid-foil sections are located at stations interjacent between the root and the tip, wherein the values of the mean-line camber of the interjacent fluid-foil sections are at variance with the values of the mean-line camber obtainable at the respective spanwise stations by means of straight-line fairing between the fluid-foil section located at the root of the lifting surface and

the fluid-foil section located at the tip of the lifting surface, and wherein the aforesaid fluid-foil section at the tip of the lifting surface has a thickness ratio smaller than the optimum thickness ratio for absolutely maximum attainable section lift coefficient of the fluid-foil series employed, so that a fluid-foil section having the optimum thickness ratio obtained by conventional interpolation between two of the controlled sections lies a short distance inboard of the tip of the lifting surface, near the spanwise station at which the highest actually prevailing section lift coefficient occurs.

10. A lifting surface with three or more controlled fluid-foil sections and having a highest actually prevailing section lift coefficient at a predetermined spanwise station, in which the first section with the smallest mean-line camber and greatest thickness ratio is located at the root, the second section with the greatest mean-line camber and smallest thickness ratio is located at the fluid-dynamically effective tip, and third or additional fluid-foil sections are located at stations interjacent between the root and the tip, wherein the values of the thickness ratio of the interjacent fluid-foil sections are greater than the values of the thickness ratio obtainable at the respective spanwise stations by means of straight-line fairing between the fluid-foil section located at the root of the lifting surface and the fluid-foil section located at the tip of the lifting surface, and wherein the aforesaid fluid-foil section at the tip of the lifting surface has a thickness ratio smaller than the optimum thickness ratio for absolutely maximum attainable section lift coefficient of the fluid-foil series employed, so that a fluid-foil section having the optimum

thickness ratio obtained by conventional interpolation between two of the controlled sections lies a short distance inboard of the tip of the lifting surface, near the spanwise station at which the highest actually prevailing section lift coefficient occurs.

11. A lifting surface with three or more controlled fluid-foil sections, in which the first section with the smallest mean-line camber is located at the root, the second section with the greatest mean-line camber is located at the fluid-dynamically effective tip, and the third or additional fluid-foil sections are located at stations interjacent between the root and the tip, wherein the values of the mean-line camber of the interjacent fluid-foil sections are smaller than the values of the mean-line camber obtainable at the respective spanwise stations by means of straight-line fairing between the fluid-foil section located at the root of the lifting surface and the fluid-foil section located at the tip of the lifting surface.

12. A lifting surface with three or more controlled fluid-foil sections, in which the first section with the smallest mean-line camber and greatest thickness ratio is located at the root, the second section with the greatest mean-line camber and smallest thickness ratio is located at the fluid-dynamically effective tip, and the third or additional fluid-foil sections are located at stations interjacent between the root and the tip, wherein the values of the thickness ratio of the interjacent fluid-foil sections are smaller than the values of the thickness ratio obtainable at the respective spanwise stations by means of straight-line fairing between the fluid-foil section located at the root of the lifting surface and the fluid-foil section located at the tip of the lifting surface.

13. A lifting surface with three or more con-

trolled fluid-foil sections, in which the first section with the smallest mean-line camber is located at the root, the second section with the greatest mean-line camber is located at the fluid-dynamically effective tip, and one of the interjacent fluid-foil sections is located near a spanwise point where a tangent to the inboard portion of a curve representing the spanwise distribution of actually prevailing section lift coefficients for a given planform intersects a substantially horizontal tangent to the highest point of the same curve, wherein the values of the mean-line camber of the interjacent fluid-foil sections are smaller than the values of the mean-line camber obtainable at the respective spanwise stations by means of straight-line fairing between the fluid-foil section located at the root of the lifting surface and the fluid-foil section located at the tip of the lifting surface.

14. A lifting surface with three or more controlled fluid-foil sections, in which the first section with the smallest mean-line camber is located at the root, the second section with the greatest mean-line camber is located at the fluid-dynamically effective tip, and one of the interjacent fluid-foil sections is located near a spanwise point where a tangent to the inboard portion of a curve representing the spanwise distribution of actually prevailing section lift coefficients for a given planform intersects a substantially horizontal tangent to the highest point of the same curve, wherein the values of the thickness ratio of the interjacent fluid-foil sections are smaller than the values of the thickness ratio obtainable at the respective spanwise stations by means of straight-line fairing between the fluid-foil section located at the root of the lifting surface and

the fluid-foil section located at the tip of the lifting surface.

15. A lifting surface with three or more con- 40

trolled fluid-foil sections and having a highest actually prevailing section lift coefficient at a predetermined spanwise station, in which the first section with the smallest mean-line camber is located at the root, the second section with the greatest mean-line camber is located at the fluid-dynamically effective tip, and the third or additional fluid-foil sections are located at stations interjacent between the root and the tip, wherein the values of the thickness ratio of the interjacent fluid-foil sections are smaller than the values of the thickness ratio obtainable at the respective spanwise stations by means of straight-line fairing between the fluid-foil section located at the root of the lifting surface and the fluid-foil section located at the tip of the lifting surface; and wherein the aforesaid fluid-foil section at the tip of the lifting surface has a thickness ratio smaller than the optimum thickness ratio for absolutely maximum attainable section lift coefficient of the fluid-foil series employed, so that a fluid-foil section having the optimum thickness ratio obtained by conventional interpolation between two of the controlled sections lies a short distance inboard of the tip of the lifting surface, near the spanwise station at which the highest actually prevailing section lift coefficient occurs.

MAURICE ADOLPH GARBELL.

16

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The following references are of record in the file of this patent:

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Number	Name	Date
1,547,644	Cronstedt -----	July 28, 1925
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1,839,349	Sigrist -----	Jan. 5, 1932
1,890,079	Focke -----	Dec. 6, 1932

PROOF OF SERVICE.

I, George B. White, attorney for Maurice A. Garbell, Inc., and the Garbell Research Foundation, Petitioners herein, and a member of the Bar of the Supreme Court of the United States, hereby certify that, on the 13th day of April 1977, I served copies of the foregoing Appendix D to the Petition for a Writ of Certiorari to the Supreme Court of the United States, as identified on the cover hereof, on the several parties thereto, as follows:

1. On The Boeing Company, Defendant, by mailing three copies in a duly addressed envelope, with first-class postage prepaid, to its attorneys,

PERKINS, COIE, STONE, OLSEN & WILLIAMS,
J. PAUL COIE,
1900 Washington Building,
Seattle, Washington, 98101.
(206) 682-8770

2. On the McDonnell-Douglas Corporation, Defendants, by mailing three copies in a duly addressed envelope, with first-class postage prepaid, to its attorneys,

LOUIS LIEBER, JR.,
WALTER J. JASON,
3000 Ocean Park Boulevard,
Santa Monica, California 90405.
(213) 399-9311, Extension 4275.

3. On The Boeing Company and the McDonnell-Douglas Corporation, Defendants, by mailing three copies in a duly addressed envelope, with first-class postage prepaid, to their attorneys,

HAHN, CAZIER, THORNTON, HOEGH & LEFF,
RICHARD B. HOEGH,
RUSSELL P. KUHN,
Crocker Citizens Plaza,
611 West Sixth Street, Fourteenth Floor,
Los Angeles, California 90017.
(213) 628-6151.

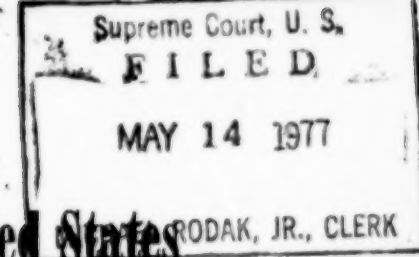
It is further certified that all parties required to be served have been served.

George B. White

George B. White,
Attorney for Petitioners,
806 Grant Building,
1095 Market Street,
San Francisco, California 94103.
(415) 621-7065.

Service of the within and receipt of a copy thereof is hereby admitted this day of May, A.D. 1977.

IN THE
Supreme Court of the United States



October Term, 1976
No. 76-1425

MAURICE A. GARBELL, INC., and GARBELL RESEARCH
FOUNDATION, *Petitioners,*

vs.

THE BOEING COMPANY, *Respondent.*

and

MAURICE A. GARBELL, INC., and GARBELL RESEARCH
FOUNDATION, *Petitioners,*

vs.

MCDONNELL-DOUGLAS CORPORATION, *Respondent.*

On Petition for a Writ of Certiorari to the United States
Court of Appeals for the Ninth Circuit.

BRIEF IN OPPOSITION.

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BRIEF IN OPPOSITION.

INTRODUCTION.

The trial of these patent actions took up 56 days spread over three years; 1970, 1971 and 1972. The patent in suit, U.S. Patent No. 2,441,758, was applied for by Maurice A. Garbell over 30 years ago, and it expired 12 years ago. The cases were filed in the District Court 13 years ago.

During the pendency of the actions, the court file grew ten feet tall. Exhibits for each side number several hundred. The Findings of Fact, 385 F.Supp. 1-39, disposed of the issues. The law was properly applied (385 F.Supp. 1, 39-44), as the Court of Appeals for the Ninth Circuit confirmed (546 F.2d 297).

The courts below properly applied the controlling statutory and constitutional provisions as heretofore adequately laid down by the Supreme Court. There is no conflict of decision among the Circuit Courts, and there does not appear to be any issue of law requiring restatement by the Supreme Court.

Respondents submit, therefore, that no reason for granting a writ of certiorari exists.

The courts below followed this Court's decisions. See Conclusions of Law, 385 F.Supp. 1, 39-44, 546 F.2d 297. They held the patent in suit invalid since: it did not meet the test of novelty and utility as required by 35 U.S.C. Section 101; it was anticipated by prior art and thus invalid under 35 U.S.C. Section 102(a); the invention had been described in a printed publication on sale and in public use more than one year prior to the date of the application for the patent as contemplated by 35 U.S.C. Section 102(b); the subject matter of the patent was obvious to one skilled in the art and thus the patent was invalid under 35 U.S.C. Section 103; and the teachings of the patent were insufficient and the claims ambiguous under 35 U.S.C. Section 112. The courts below also found the case to be exceptional and awarded defendants reasonable attorney fees pursuant to 35 U.S.C. Section 285.

The Trial Court's Preliminary Findings and Memorandum Decision, its Findings of Fact and Conclusions of Law fully support its judgment (385 F.Supp. 1), and the substantial preponderance of evidence supporting each finding was documented for the Trial Court. [C.T. 3387, *et seq.*; 3485, *et seq.*; 3522-3554].

Questions Presented.

Should this Court grant certiorari to review the evidence in patent cases in which the issues were factual issues only and in which the law was then correctly applied to the facts?

Should this Court grant certiorari to review patent cases in which the courts below followed well-established rules laid down by this Court for determining invalidity of a patent?

Should this Court grant certiorari in patent cases in which the defendants were awarded compensation for a portion of their attorney fees where the patentee misled the Patent Office in obtaining the patent in suit and falsely testified in a prior action in obtaining a trial court decision of validity?

Should this Court grant certiorari in patent cases where the Garbell patentees came into these actions with "unclean hands", the Garbell patentees filed the actions for infringement of a patent they knew to be and they themselves helped prove to be invalid, the Garbell patentees never assessed their allegations of infringement prior to filing suit or to this day, the Garbell patentees withheld pertinent information from the Patent Office, the Garbell patentees used (and are still using) a prior decree obtained by Garbell's false testimony, and through it all, the Garbell

patentees have prolonged these actions beyond reason by their harassment and vexatious behavior?

The Statement which follows draws primarily on the testimony of Dr. Maurice A. Garbell, patentee and president of the two plaintiff corporations. Respondents submit that it demonstrates that the cases were correctly decided and that the cases do not meet the requirements of Rule 19 for granting certiorari.

History of Dr. Garbell's Inequitable Conduct. Dr. Garbell Suppressed Pertinent Facts From the Patent Office and Misled District Court Judge Yankwich in Obtaining the Earlier CVAC Decree.

Dr. Garbell Suppressed Pertinent Facts From the Patent Office and Claimed the Prior Art as His Own.

Over thirty years ago, on July 16, 1946, Dr. Garbell made application to the Patent Office praying for the grant of Letters Patent for an alleged new and useful invention of a "Fluid-Foil Lifting Surface" or wing which utilizes three or more airfoil sections.

In an Italian article published in 1938, Dr. Garbell's 16 year old colleague, Mr. G. Preti, wrote of the advantages of combining more than two airfoil sections in a wing. In Exhibit AI, Preti states:

"All airplane designers know the advantages which are obtained by the use of wings, the profile of which is not constant, but varies from root to tip." [Ex. AI; R.T. 535, 539].

On July 16, 1946, when Dr. Garbell applied for the '758 parent patent in suit, the following facts were known to him: (1) There had been *prior printed publications* describing the "Garbell Wing"; (2) There had been prior public use of the "Garbell Wing", and *public demonstrations* of sailplanes incorporating

the "Garbell Wing"; and (3) The "Garbell Wing" was *on sale* more than one year prior to the date of the '758 parent patent application and Garbell actively participated in those sales efforts. Dr. Garbell withheld these facts from the Patent Office.

In his oath to the Patent Office, Dr. Garbell swore that he was the original, first and sole inventor of the alleged invention or discovery described and claimed by him; he swore that he did not know and did not believe that the alleged invention was ever described in any printed publication in any county, or in public use or on sale in the United States for more than one year prior to the date of his patent application, *i.e.* July 16, 1945 [Ex. AU-1, p. 33; R.T. 224-226, 437]. Dr. Garbell's oath is false.

The Sailplanes Were Publicly Demonstrated and Were Described in Printed Publications.

In the '758 parent patent specification, Dr. Garbell states:

"Numerous flight tests and wind tunnel tests in reputable wind tunnels such as the California Institute of Technology, the Massachusetts Institute of Technology, the various wind tunnels of the National Advisory Committee for Aeronautics, and elsewhere have demonstrated convincingly that each of the objects of this invention has been fully achieved. The tests were performed on numerous wing models, on sailplanes, and on models of at least five aircraft designs of widely varying design scope employing a wide variety of airfoil series." [Ex. AU, Col. 10, lines 50 et seq.; Ex. AU-1, R.T. 224-225, 437; FF H9, 385 F.Supp. 1, 27].

The "flight tests" referred to were tests of sailplanes only, and the Pinguino sailplane was one of the references intended to be included by the use of the term "sailplanes" [R.T. 627-628; FF H9, 385 F.Supp. 1, 27].

At the time Dr. Garbell wrote the '758 parent patent application and took oath in the Patent Office, he knew the "sailplanes" referred to in the specification were not solely designed by him [R.T. 534-536]. In 1936, when he was a student in Milan, Garbell and a 16-year-old colleague by the name of G. Preti designed several sailplanes which incorporated wings defined by as many as four airfoil sections (from the root section to the tip airfoil section of each wing) [R.T. 269-272, 532-537, 619-631]. The students in Milan, including Garbell and Preti, built the "G.P." (Garbell-Preti designs) sailplanes, and when they completed building them, the students went out and took turns testing them in flight [R.T. 132-135, 273, 535, 627-629]. The "numerous flight tests" "performed on sailplanes" "employing a wide variety of airfoil sections" which "have demonstrated convincingly that each of the objects of this invention has been fully achieved" were the flights that the Milan students took in the "G.P." (Garbell-Preti) sailplanes in the years 1937 and 1938 [Ex. AU, the patent in suit, Col. 10, line 50 et seq., R.T. 132-135, 273, 535, 626-629; 437]. The sailplanes were publicly demonstrated by the Milan students at various Italian airports in 1937 and 1938, and both Garbell and Preti wrote articles describing the wing design features of these sailplanes. These wing descriptions appeared in printed publications and were circulated in Europe in the late '30s [Exs. AC & AD,

in ev. 7/15/70 at Special Master Hearing; Ex. AE, R.T. 347, 436; Ex. AI, R.T. 535, 539; R.T. 264, 266, 536).

Garbell Suppressed the Pertinent Prior Art Pinguino Sailplane Publications From the Patent Office. The Pinguino Has a "Garbell Wing".

The "G.P.1" which the Milan students named after a flightless bird, the Pinguino (or the "little Penguin") has special significance in this case and is pertinent prior art. Dr. Garbell testified in these actions that the Pinguino prior art wing achieved the same result as the wings covered by the claims of the '758 parent patent in suit [R.T. 273; 626-631]. Garbell knew that the sailplanes were not solely designed by him [R.T. 534-536], he knew they were described in printed publications in the late '30s, and he knew that what he claimed in the '758 parent patent application did not achieve any "unexpected results" over those sailplanes [R.T. 532-537, 619-631].

Dr. Garbell did not disclose to the Patent Office the printed publications describing the pertinent prior art Pinguino, Asiago and Arcore sailplanes [R.T. 269-270]. Garbell did not even cite to the Patent Office the sailplane publications that he, himself, had written and that he knew were published and circulated in 1938 [R.T. 269-270]. Garbell withheld and suppressed from the Patent Office the prior use of these sailplanes by the Milan students in public demonstrations in 1937 and 1938.

The printed publications and the public demonstrations directly affect patentability. Dr. Garbell had a duty to disclose this pertinent prior art to the Patent Office.

On August 5, 1946, two weeks after filing the '758 parent patent application, Dr. Garbell put CVAC, his former employer, on notice that it had come to Garbell's attention that CVAC was using his "well known method" of "safety wing design" [Ex. RM-3, p. 638; R.T. 726-729, 1084]. Garbell had been paid by Consolidated Vultee Aircraft Corporation ("CVAC") to work on wing designs during his employment by CVAC from September, 1942, until October 15, 1945.

After placing CVAC on notice as to the alleged invention claimed by Garbell in the '758 patent application, Garbell wrote letters to most, if not all, of the airframe manufacturers in this country and in Great Britain [Exs. RA, RB, RC, RF to RF-3, RH, RH-1, RI, RI-1, RJ, RJ-1, RK to RK-2, SF, SG; R.T. 277, 438; 279, 439; 306, 439; 513-514, 764; 2903, 3127; 845, 948; 3588, 3602; 2579, 2582; 2580, 2582] trying to interest them in using his alleged "safety wing design". The replies received by Garbell from the airframe manufacturers, including defendants Boeing and Douglas, stated that the subject matter of Garbell's alleged invention was old and unpatentable [R.T. 788-791].

One of the letters written by Garbell on August 6, 1946, to The Glenn L. Martin Company [Exs. RF, RF-1; R.T. 513-514, 764], prompted the response of William K. Ebel, Vice President Engineering, of The Glenn L. Martin Company [Ex. RF-2; R.T. 513-514, 764]. Mr. Ebel inquired of Garbell on August 21, 1946:

"In connection with your proposal, our patent department has raised the question of invention rights between yourself and Consolidated. Al-

though your letter indicates that you have a patent application filed in your name covering the development, it is not clear that you hold title to the invention to the exclusion of Consolidated. We would appreciate any information you are disposed to provide us in this connection." [Ex. RF-2; R.T. 513-514, 764].

When Garbell received that letter [Ex. RF-2; R.T. 513-514, 764], he had a problem—he was on the horns of a dilemma. He needed to show a reduction to practice of the claimed discovery in the '758 application for patent before he commenced his employment by CVAC in 1942.

On August 26, 1946, Garbell wrote to The Glenn L. Martin Company, Mr. William K. Ebel, Vice Pres. Eng., stating:

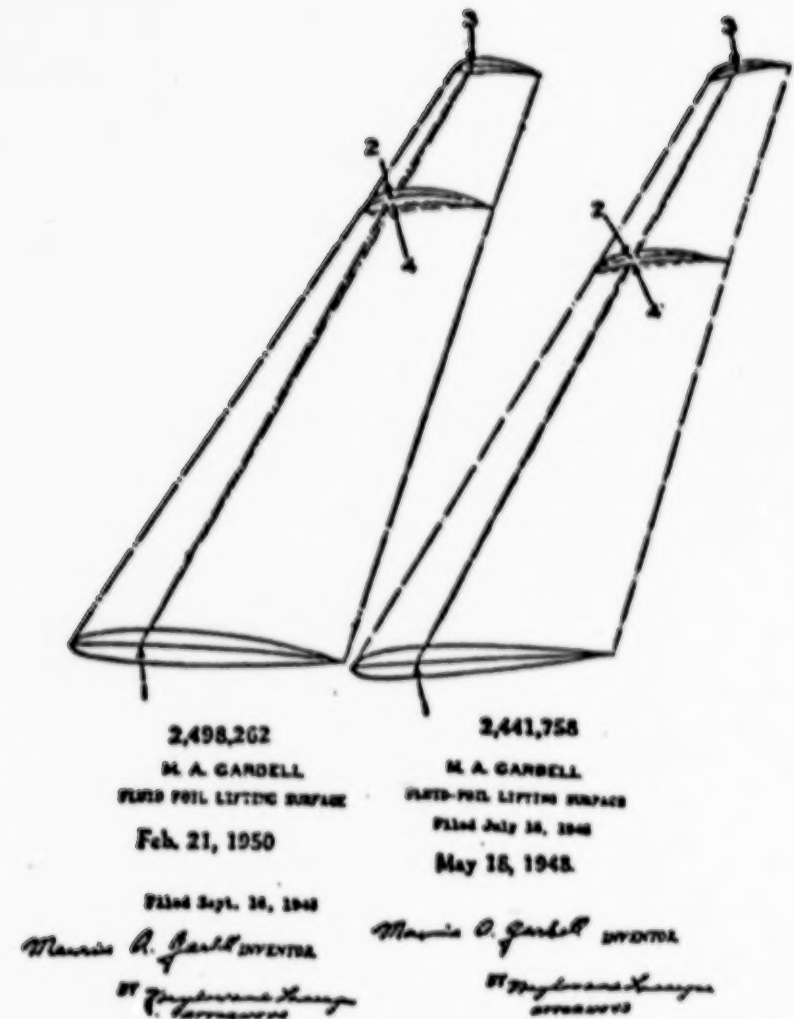
"Regarding my title to the said invention, I trust that the following information will clear up any question in your mind: (1) *The invention was conceived by me, first realized and test-flown, and further developed to its present state of fulfillment prior to my undertaking professional relationship with the Consolidated Aircraft Corporation;* (2) At no time did I assign the invention, or any part of it, to the Consolidated Aircraft Corporation, the Consolidated Vultee Aircraft Corporation, or to anyone else . . .". [Ex. RF-3; R.T. 513-514, 764].

After Garbell wrote to the Glenn L. Martin Company stating, in effect, that the sailplane designs were solely his own discovery or alleged invention since the Milan students' sailplanes were the only designs which were incorporated in an actual airplane and

"test-flown" prior to Garbell's "undertaking professional relationship with the Consolidated Aircraft Corporation" in 1942, Garbell went back to the Patent Office and specifically claimed the Pinguino sailplane by filing a "continuation-in-part" application and expanding his claims contained in the co-pending parent application which issued as the '758 patent in suit. [Exs. AU, AU-1, AV, AV-1; R.T. 239, 437; 245, 438; 270; Exs. AC AD, AE; Exs. AC & AD, in ev. 7/15/70 at Special Master Hearing; Ex. AE; R.T. 347, 436], Garbell expanded his claims to the alleged invention by filing a "continuation-in-part" application in the Patent Office on September 16, 1946, and claimed the Pinguino wing as part of his alleged invention disclosed in the co-pending parent application. [R.T. 619-621; Exs. AU-1, AV-1 in claim 3; R.T. 239, 437; 245, 438.] Again, Garbell did not disclose to the Patent Office the printed publications describing the Pinguino wing design [R.T. 269-270].

Just for the sake of comparison, the Pinguino prior art wing claimed by Garbell in U.S. Patent No. 2,498,262 ('262 CIP) patent and depicted by Garbell in the '262 patent; and a depiction of one of the wings claimed by Garbell in the '758 patent and illustrated in the '758 patent in suit [Exs. AU, AV; R.T. 239, 437; 245, 438] are herein set forth on the following page.

The pertinence of the Pinguino sailplane wing as prior art is not now open to doubt. The prior art Pinguino sailplane is the FOUNTAINHEAD of the "Garbell Wing". The Pinguino wing is the same in elements, function and result to that claimed by Garbell in the '758 patent in suit.



(Left) THE PRIOR ART PINGUINO WING CLAIMED IN THE '262 CIP PATENT.
(Right) A WING SHOWN IN FIG. 1 OF THE '758 PARENT PATENT IN SUIT.

**The Prior Art Pinguino Sailplane Is the Fountainhead
of the "Garbell Wing".**

Further comparison shows that:

1. Figure 2 of the '262 CIP patent is identical to Figure 2 of the '753 patent. [Exs. AU, AU-1, AV, AV-1; R.T. 239, 437; 245, 438]. In designing the Pinguino prior art wing, Garbell and Preti made the same sketch as that depicted in Figure 2 of both these patents [R.T. 532-536].

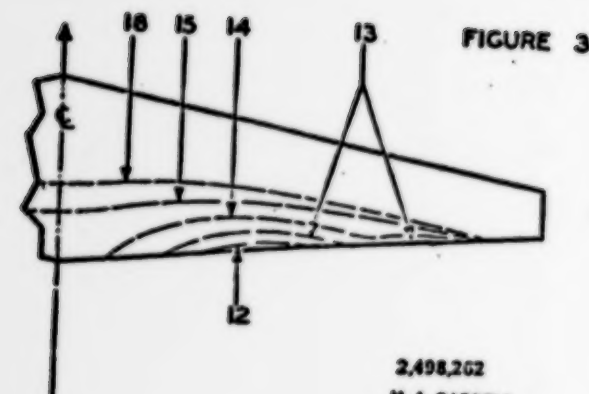
2. The principles of the alleged invention were fully demonstrated in the Pinguino prior art wing as stated in the specifications of both the '758 patent and the CIP '262 patent [Ex. AU, Ex. AV; R.T. 239, 437; 245, 438].

3. As depicted in Figure 3 of both patents [Exs. AU and AV; R.T. 239, 437; 245, 438], the intended results, which Dr. Garbell likes to call the "Garbell Stall", are the same.

Garbell testified [R.T. 273] that the Pinguino prior art wing achieved the same result as the wings covered by the claims of the '758 patent in suit and in the Pinguino Patent No. 2,498,262 which issued to the Garbell plaintiffs on February 21, 1950 [Exs. AU, AU-1, AV, AV-1; R.T. 239, 437; 245, 438].

On May 18, 1948, the '758 patent in suit issued to Dr. Garbell. On February 21, 1950, the '262 CIP Pinguino patent issued to Dr. Garbell.

By taking oath in the Patent Office to the general effect that the Pinguino prior art wing design, *publicly demonstrated* was not described in printed publications in the late '30s, Garbell was granted the '758 patent and the '262 "continuation-in-part" patent [Exs. AU-1, p. 33, AV-1, p. 26; R.T. 239, 437; 245, 438].



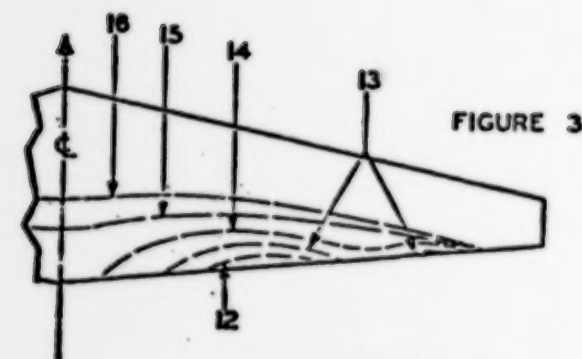
2,498,262
M. A. GARBELL
FLUID FOIL LIFTING SURFACE
Feb. 21, 1950

Filed Sept. 18, 1948

Maurice A. Garbell INVENTOR

By *Thompson & Thompson*
ATTORNEYS

(Above) GARBELL STALL USING
PRIOR ART PINGUINO WING
CLAIMED IN THE '262 CIP PATENT.



2,441,758
M. A. GARBELL
FLUID-FOIL LIFTING SURFACE
Filed July 18, 1948
May 18, 1948

Maurice A. Garbell INVENTOR

By *Thompson & Thompson*
ATTORNEYS

(Above) GARBELL STALL SHOWN
IN FIG. 3 OF THE '758 PARENT
PATENT IN SUIT.

The Garbell Patentees' Reliance on the Earlier CVAC Decree Is Unfounded. Garbell Misled District Court Judge Yankwich, the Trier of Fact in the CVAC Action.

The '758 patent was previously litigated in this District in an action by the Garbell corporations against Garbell's former employer, Consolidated Vultee Aircraft Corporation (hereinafter called CVAC), and CVAC's purchaser, American Airlines, Inc. (Civil Action No. 10930-Y, 1950.) *Maurice A. Garbell, Inc., et al. v. Consolidated Vultee Aircraft Corp., et al.*, 94 F.Supp. 843, reversed 204 F.2d 946, cert. denied 346 U.S. 873.

The CVAC record and testimony, especially that of Dr. Garbell, was presented to the Trial Court in the present actions and it is in evidence as Exhibits RM-1 through RM-5 [R.T. 833-834, 1084]. Garbell's testimony in the present actions, proves that Garbell actually knew facts which would have invalidated the '758 patent, 385 F.Supp. 1, 26-30, but he did not disclose them to the Trial Court in the CVAC action. Evidence that Garbell testified untruthfully before District Judge Yankwich and suppressed facts within his knowledge which would have rendered the '758 patent invalid is outlined herein.

In the 1950 Trial, Garbell Misled District Court Judge Yankwich on the Prior Art Pinguino Statutory Bar.

In November of 1950, at the four-day trial of the Garbell plaintiffs vs. CVAC and American Airlines, the defendants presented to the trial court the printed publications describing the Pinguino sailplane. The sailplane publications were uncovered by the defendants CVAC and American Airlines without the aid of Dr. Garbell.

Despite the fact that the '262 *Pinguino* Patent had issued to Garbell on February 21, 1950, Garbell did not disclose this fact to the Trial Court in the CVAC action when he testified before Judge Yankwich in November of 1950, eight months later. The defendants in the CVAC action presented to District Judge Yankwich the prior printed publications describing the Pinguino design, but Garbell suppressed the fact that the Pinguino was claimed by him as a "continuation-in-part" of the alleged invention claimed by him in the '758 patent [CVAC R. Tr. 197-202; Exs. RM-1, RM-2; R.T. 833, 834].

The testimony of Garbell goes on to mislead Judge Yankwich into believing that the Pinguino wing design, if used on a powered airplane, was not feasible and even dangerous:

"Q. Could you have used the Pinguino wing on a powered-driven plane, other than maybe a powered glider?"

"A. (GARBELL) I don't quite understand that, a powered glider?"

"Q. Well, in a very, very light weight low powered plane, could you have used a Pinguino wing?"

"A. (GARBELL) Yes, if the craft was powered merely to the extent of flying at the speeds at which the Pinguino was intended to glide. But if the speeds were to exceed that characteristic gliding experience of the Pinguino, that would not have been feasible."

"Q. Would it set up such a twist in the wing that it was liable to tear it off or destroy it?"

"A. (GARBELL) Well, it would have done that . . ." [CVAC R. Tr. 197-199; Exs. RM-1, RM-2; R.T. 833, 834.]

At no time during the CVAC trial, did Garbell disclose to District Judge Yankwich the fact that he had been issued the '262 CIP patent, the fact that he claimed the Pinguino wing in Claim 3 of the '262 CIP patent, or the fact that the Pinguino wing was identical in elements, function or result to that claimed by him in the '758 patent. Garbell misled District Judge Yankwich in his testimony to the effect that the Pinguino wing could not be utilized on a powered airplane when *he knew* at the time he testified before Judge Yankwich *that in the Specification of the '262 CIP Pinguino patent* that had issued in February of 1950, *he had stated:*

"This invention accomplishes an important improvement in the art, and *the discoveries herein disclosed are of great value to all types of aircraft* (as well as to craft operating on other fluids), *throughout their entire operating range, . . . ; also in violent maneuvers at high speeds . . .*". [Ex. AV, Col. 8, lines 58-68; R.T. 239, 438.]

Garbell swore before District Judge Yankwich that from the wing design of the Pinguino, as described in printed publications circulated in the late 30s:

"There is a need for an inventive effort, with the description, from the description of the Pinguino or any other description of the Pinguino to this wing." [CVAC R.T. 137; Exs. RM-1, RM 2; R.T. 833, 834.]

"Further, Garbell swore to Judge Yankwich that from the published Pinguino wing description, *'that description could not have been applied to obtain a usable wing for a high-speed or highly loaded airplane'*" [CVAC R.T. 137; Exs. RM-1, RM-2; R.T. 833, 834].

From these same prior printed publications on the Pinguino wing design, the Special Master was able to make geometry findings on the Pinguino wing [C.T. 2652-2653; Exs. AC and AD in evidence at the trial before the Special Master]. Garbell finally admitted on March 9, 1972, at the trial in these actions, *that he claimed*, in Claim 3 of the '262 CIP patent application, *the wing of the Pinguino* [R.T. 619].

Garbell Did Not Make a Full and Fair Disclosure of All the Pertinent Facts to the Patent Office or to the District Court in the CVAC Action. Garbell Suppressed All the Facts and Disclosed Only Half the Facts to Each Tribunal.

Thus, in obtaining his claims in the '758 patent and in the '262 CIP patent, Garbell suppressed the prior printed publications describing the Pinguino wing. When he testified in the CVAC action, Garbell suppressed the '262 CIP patent in which he claimed the Pinguino wing design. Garbell prevented the Patent Office and District Judge Yankwich from properly functioning in their duties by suppressing pertinent facts from both the Patent Office and the Trial Court Judge in the earlier CVAC action. Neither the Patent Office, nor District Judge Yankwich had before it *both* the Pinguino prior printed publications and the '262 CIP Pinguino patent at the same time. The Patent Office knew what Garbell was claiming, but did not know of the printed publications. Trial Judge Yankwich knew about the prior publications on the Pinguino, but did not know about the '262 Continuation in part Pinguino patent. Garbell did not make a full and fair disclosure of *all* the pertinent facts to the Patent Office or to the District Court in the CVAC action. Garbell suppressed *all* the facts and *disclosed only half the facts* to each tribunal.

The District Court's Findings [F. of F. H5 to H17, N13 to N15; 385 F.Supp. 1 at 27-38] of the Garbell plaintiffs, and Garbell's own behavior, are: "Such conduct is below the standards of good faith and candor in inventors . . .". The District Court's findings could not have been different. The record in the present actions is replete with evidence that Dr. Garbell testified untruthfully in the CVAC trial.

The following are highlights of the testimony of Dr. Garbell in obtaining the earlier CVAC decree compared with the testimony and evidence presented at the trial in these actions. The comparison proves that the Garbell plaintiffs' reliance on the earlier CVAC decree is unfounded. Dr. Garbell came into these actions with "unclean hands".

From the time the Garbell plaintiffs filed the present actions in 1963, at all times during the period these cases were pending, and now in their Petition for Writ of Certiorari, the Garbell plaintiffs have made use of the early decree of validity in the action of *Maurice A. Garbell, Inc., and Garbell Research Foundation v. Consolidated Vultee Aircraft Corporation and American Airlines*, 94 F.Supp. 843 (S.D. Cal. 1950); reversed at 204 F.2d 946; cert. denied 346 U.S. 873, 74 S.Ct. 122, 98 L.Ed. 381; ultimately dismissed with prejudice. In addition to the use of the CVAC decree in the District Court [C.T. 328-386, 654, 1560, 1594, 1913-1915], and in the Ninth Circuit (App. Br., No. 74-1017], the Garbell plaintiffs continue to use the CVAC decree in their Petition for Writ of Certiorari as a justification for coming into the present actions with "unclean hands", and as a justification of patent validity (Pet. for Writ of Cert., pp. 3, 4, 6, 8, 9, 11, 12, 16). In essence, the Garbell plaintiffs state that because

the Ninth Circuit Court of Appeals, in reversing the CVAC case, "did not tell the patent holders that they did not possess a valid patent", that somehow the patent is still valid. Plaintiffs further state, "nothing occurred between 1950 and 1963 to disabuse the patent holders of their understanding that their patent was and is valid" (Pet. for Writ of Cert., p. 11). The Garbell plaintiffs ignore the testimony of Dr. Garbell in obtaining the CVAC decree.

Garbell's Sworn Testimony Changes as the Issues Change.

Dr. Garbell's testimony has changed as the issues have changed. When the issue was "shop rights" in the CVAC action, Dr. Garbell claimed he did no wing design work at CVAC [Exs. RM-1 and RM-2, CVAC R. Tr. 415-416, 432, 459, 833, 834]. After testifying before Judge Yankwich that he did no wing design work at CVAC [R.T. 3569 to 3571], Dr. Garbell appeared as an expert on aerodynamics in the case of *Lockwood v. Piper Aircraft* [Ex. 50; R.T. 650, 3581, 3598] at which time he stated, again under oath, that he did the work of the entire aerodynamics group at CVAC, and also that he had supervised the CVAC divisions at San Diego, Downey and Detroit. When the issue was "whether Dr. Garbell was the sole inventor", Dr. Garbell testified that he did extensive wing design work at CVAC [Exs. 203-1 thru 203-11; R.T. 3323, 3326; Ex. 702; R.T. 3376 to 3539]. Before Judge Yankwich, Garbell testified that he did not work out "the details of how to make a wing of this kind and present the details to Consolidated in detail, at their expense" [R.T. 3569-3571]. When the issue was "operability", Dr. Garbell stated [Exs. AU, AV] that the Pinguino sailplane demon-

strated convincingly that each of the objects of the "Garbell Wing" had been fully achieved, and in the oath accompanying the application for the patent, Dr. Garbell swore that the invention had not been described in printed publications, although the Pinguino had been fully described in printed publications in Europe during the late '30s [*Exs. AC & AD, in ev. 7/15/70 at Special Master Hearing; Ex. AE, R.T. 347, 436*].

The XB-46 Airplane Wing Was on Sale and Sold Prior to the Critical Date. Contrary to Garbell's 1950 Testimony, the XB-46 Had a 3-Section Wing, Later Patented by Garbell.

At the trial in the present actions, Dr. Garbell testified that he had charge of the XB-46 wing design— aerodynamic design, while employed by CVAC. He "proposed the shape of the wing" and convinced "higher-ups" to ultimately adopt his "configuration". He "wrote the proposal for the Government". He made sure "that proposal was carried over into the wind tunnel model". He knew that the loft lines defining the actual B-46 airplane wing conformed to his configuration, *i.e.*, a 3-section wing [*R.T. 637-650, 944-946, 3546-3547, 3370*]. Yet, when "shop rights" was an issue in the CVAC case, Dr. Garbell testified before Judge Yankwich:

"Q. And did they ever build an XB-46 while you were employed by them?"

"A. (Dr. Garbell) *No, the only thing they had was a full-sized mock-up, that is, one to determine spaces, etc., and the mock-up wing, I looked at it very closely in the experimental factory, had a 2-section wing.*" [*CVAC Tr. 459, Ex. RM-2; R.T. 833-834*].

Dr. Garbell knew of the sales competition in which the XB-46 airplane incorporating a wing covered by the claims of the '758 patent in suit competed. Garbell testified in the present actions that no change was made to the wing shape described in the specification submitted to the Government and incorporated in the wind tunnel wing or the full-scale aircraft [*R.T. 3370, 3546-3547; Ex. 203-7; R.T. 3324, 3326; Ex. GN; R.T. 943*]. The wing of the actual XB-46 airplane corresponds to the wind tunnel wing which Garbell saw being tested at the NACA Ames Laboratory [*R.T. 637-650, 944-946, 3370, 3546-3547*] in May of 1945.

The evidence and testimony in these actions proves that Dr. Garbell's wing configuration employed in the wind tunnel wing and the full-scale aircraft is covered by claims 1, 2, 3 and 7 of the '758 patent [*R.T. 634*]. The wind tunnel wing, the mock-up and the data describing that wing were sold to the Government, and title passed prior to July 16, 1945. Payment was made to CVAC on the contract which included the purchase of the wind tunnel wing (\$94,200), the mock-up (\$183,125), and the data describing that wing (\$211,200) [*Ex. GT-1, p. 4, R.T. 939; Ex. GT, R.T. 766; Ex. GI, R.T. 913; Ex. HW, R.T. 2411; 2438; Ex. GN, R.T. 943*]. And in April of 1945, the Government required CVAC to make its data on high speed jets such as the XB-46 available to other contractors [*Ex. BO*]. In view of the fact that Garbell was still employed by CVAC until October, 1945, and in view of his testimony in these actions, he had to know that CVAC was going to use the "Garbell Wing" on the XB-46. Yet, Dr. Garbell swore to District Court Judge Yankwich:

"Q. They never told you they were going to use your 3-section wing on that XB-46?"

"A. (Dr. Garbell) No." [Ex. RM-1, RM-2, p. 459; R.T. 833, 834].

As an aside, the CVAC testimony *now relied upon as true* by the Garbell plaintiffs regarding his efforts in selling the XB-46 is that of CVAC in their motion for a new trial, not Dr. Garbell's testimony [C.T. 3734-3735].

Re Garbell's 3-Section Tailless: Contrary to Garbell's 1950 Testimony, Garbell's 3-Section Tailless Wing Was on Sale, Disclosed to the NACA, a Public Body, and Used by the NACA in 1943-1944.

In May 1944, Dr. Garbell was directly involved in selling "Garbell Wings" which he patented two years later.

Dr. Garbell testified at the trial of these actions that the data reports describing his alleged invention, incorporated in the "tailless" had been distributed to the Navy in the period of April and May of 1944 [R.T. 784], and that he went "alone" to meet with Captain Diehl of the Bureau of Aeronautics in an attempt to sell his tailless "design" (later patented) to the Navy in May of 1944 [R.T. 389], more than two years prior to applying for the '758 patent.

Dr. Garbell stated that the data on his alleged invention was available to any contractor from Captain Walter Diehl, Bureau of Aeronautics, Navy Department, Washington 25, D.C. [Ex. SM; R.T. 3561-3598].

In addition to seeing Captain Diehl on that trip, Dr. Garbell disclosed his alleged invention of the three-section wing design to Ira Abbott of the NACA; and

the NACA distributed a description of the wing to its various research facilities [Ex. 686; R.T. 3558, 1582], well before the critical date.

In *Exhibit SM*, R.T. 3561, 3598, dated October 8, 1946, and authored by Dr. Garbell, he states that his alleged invention was tested at Langley Field NACA Free-Flight Tunnel for almost a year and that "exceedingly complimentary comments were received from the NACA and the Bureau of Aeronautics" on his "safety wing design". Thus, Garbell knew at the time he wrote *Exhibit SM*, on October 8, 1946, that the data on his alleged invention had "been prepared for the Bureau of Aeronautics in 1943 and 1944", and he knew this data was circulated in NACA, a public body, R.T. 1582, 1600-1601, 784, 3558; C.T. 3750, 3753, from whom Dr. Garbell wrote he had received "exceedingly complimentary comments" on the alleged invention claimed in the '758 patent.

Garbell knew that he had placed no restrictions on the NACA, and he could not have placed any restrictions on the NACA. As Mr. Ira H. Abbott stated to the Trial Court with reference to the NACA memorandum [Ex. 686; R.T. 1582] of Garbell's disclosure to the NACA:

"Q. Were any restrictions placed on NACA personnel by the contractors with respect to dissemination of the materials contained in a memorandum such as this?"

"A. (MR. ABBOTT) Absolutely not."

"Q. Do you understand that question, Mr. Abbott?"

"A. (MR. ABBOTT) Yes I understand the question and, of course, there were no such re-

strictions placed. Sometimes we placed restrictions on the contractor's representative, but there was no authority for them to place any restriction upon our employees." [R.T. 1606].

The disclosed design is covered by claims 1, 2, 3 and 7 of the '758 patent; and is included in Convair Report ZA-101, "approved" by Garbell [R.T. 393, 402-404; Ex. DW; R.T. 393, 441].

Garbell testified before Judge Yankwich that he disclosed only a two-section wing design to the Navy. He testified that he did not try to sell a tailless airplane to the Navy which incorporated his allegedly invented wing design of "three, or more, sections", but that he had only tried to sell "the idea of a tailless design" [CVAC R. Tr. 189-190, 431; Exs. RM-1, RM-2; R.T. 833, 834].

Contrary to his statements in Exhibit SM and Exhibit 1 to his Affidavit [C.T. 3750], Dr. Garbell swore before Judge Yankwich that the NACA at Langley Field tested only a 2-section wing [CVAC R. Tr. 438; Exs. RM-1, RM-2; R.T. 833, 834].

On appeal in the present actions, the Garbell plaintiffs took a completely new stand on Garbell's sales activity in attempting to sell his tailless "safety wing design" to the Navy (*Reply Br.*, pp. 21-22). In their Reply Brief, dated August 1, 1975, more than thirty years after Garbell's sales trip to Langley Field, the Garbell plaintiffs stated that it was not Garbell's "tailless" at all, but that Garbell attempted to sell to the Navy a "tailless" patented by two other inventors.

The "Poor-Man's Garbell Wing" Was Described in an NACA Prior Art Printed Publication.

The pertinence of Garbell's visit to Captain Walter Diehl and the NACA at Langley Field in May of 1944, is that the essence of the "Garbell Wing" had been published and was well known more than one year prior to his patent application. This knowledge was imparted through reports and publications by Garbell himself, as well as by other aeronautical engineers and the National Advisory Committee on Aeronautics.

A wing which Garbell referred to as "a Poor-Man's Garbell Wing" was described in a printed publication more than one year before the patent application was filed.

Dr. Garbell referred to the modified XB-36 wing, the one which is covered by Claim 11, as "a poor-man's Garbell". Garbell, in fact, took pains to attribute the design to Mr. Abbott [R.T. 907-908], for the purpose of tracing the lineage of the design to Garbell's discussions with Abbott at Langley [Ex. 686; R.T. 1582]. NACA Report No. L5B23 (meaning Langley, 1945, February 23rd) disclosing the NACA work on the modified XB-36 wing was published by the NACA in February 1945, as Mr. Sivells testified [R.T. 2363-2393]. The testimony of Mr. Thomas Neill [R.T. 2020-2029], and the NACA records [Exs. SD1-SD10; R.T. 2020, 2029], proves that the Wartime Report on the modified B-36 wing [Ex. KF; R.T. 1348, 1396], was released and available to government contractors in March 1945. During Garbell's deposition he was asked "did you have access to the Wartime Reports prepared by NACA while you were at Convair?" He answered: "Some, yes. Those pertinent to my work." [Ex. HT, p. 361; R.T. 774, 826, 1083].

The modified B-36 had a stall progression pattern similar to that shown in the patent [R.T. 2370, 2371, Ex. AU, Fig. 3]. Dr. Garbell acknowledged that the modified wing "did show the effectiveness of that airfoil configuration in some improvement of the stall." [R.T. 908].

Contrary to Dr. Garbell's oath to the Patent Office, and his testimony before District Court Judge Yankwich, the "Garbell Wing" was described in printed publications, was in public use and on sale all more than one year prior to the date of the '758 parent patent application. In spite of Garbell's misconduct in the Patent Office and his going into the CVAC action with "unclean hands", the Garbell patentees proceeded into these actions in 1963, and maintained them to this date.

The Garbell Plaintiffs Came Into These Actions With "Unclean Hands". Garbell Is Using an Unlawful Monopoly Unlawfully.

Respondents submit that the foregoing highlights the fact that the Garbell plaintiffs came into these actions with "unclean hands" and that Garbell has demonstrated a reckless disregard for the truth. These actions were not filed or maintained in good faith. It would be unconscionable to require the defendants to bear the burden of their defense cost since (1) the Garbell plaintiffs filed the actions for infringement of a patent they knew to be, and they themselves helped prove to be invalid, (2) they withheld pertinent information from the Patent Office, (3) they used, and are still using, a prior decree obtained by Garbell's false testimony, (4) they came into these actions with "unclean

hands", and (5) through it all, they have prolonged these actions beyond reason.

Garbell plaintiffs acted in bad faith in bringing these actions in 1963, for alleged infringement of the '758 patent they knew to be invalid and not patentable over the prior art. They prolonged the litigation doubtless to extort settlement money from the defendants. They failed to assess their infringement allegations against defendants in the nine years these two cases were pending in the District Court [Ex. HT, p. 124; R.T. 774, 826, 1083; R.T. 858-859, 879-880; C.T. 3485 et seq.]. By their delaying tactics, they frustrated the Special Master [C.T. 3485 et seq.], the Trial Court, and the defendants in trying to move these cases to a final determination in trial before the District Court. (District Court's Preliminary Findings and Memorandum Decision, 385 F.Supp. 1, at 2-9, 37-38).

That the '758 patent is invalid and should not have been issued in the first place is clearly set forth in the District Court's Preliminary Findings and Memorandum Decision, Findings of Fact and Conclusions of Law. (385 F.Supp. 1-57.) Record support for the Court's findings can be found in Defendants' Post Trial Summary of Facts. [C.T. 3387, et seq.] Additional record support for the District Court's findings is at Clerk's Transcript, pages 3528-3554.

The Plaintiffs Set Out to Avoid Trial on Validity.

From the time the Garbell plaintiffs filed these actions in 1963, they have made use of the earlier CVAC decree of validity [C.T. 328-386, 654, 1560, 1594, 1913-1915] doubtless to avoid a validity trial in the present actions and a consideration of the testimony

and evidence relied upon by the District Court Judge Yankwich in making that decree [*R.T. June 2, 1972*].

In January of 1970, the Garbell plaintiffs made a motion to expand the existing reference to the Special Master and requested a trial before the Special Master on the geometry of certain prior art wings and the geometry of the allegedly infringing wings [*C.T. 1307; 1335; 1338; 1341; 1449, 1557, 1582*]. This trial before the Special Master was requested to take place at a time when these actions were scheduled to move to trial before the District Court [*C.T. 1128, 1152, 1154*]. Their motion was granted by the Trial Court [*C.T. 1609, 1610*]. The actual determination of the issues of validity and infringement was reserved for trial before the District Court, as was the determination of the aerodynamic significance of the Special Master's geometry findings [*C.T. 1609, 1610*].

The Curtiss-Wright Model 21B and Model 23 Airplane Wings Anticipate the Claims of the Patent in Suit.

The trial before the Special Master commenced in June of 1970, and lasted 30 days, including closing arguments. The Special Master's original Report was filed with the District Court in December, 1970 [*C.T. 2285, et seq.; 2498, Court Exhibit 1; R.T. 69*]. The geometry findings of the Special Master rendered the '758 patent invalid [*Garbell: R.T. 848*].

In early 1971, a hearing was held in the District Court on the objections of both parties to the Original Report of the Special Master [*C.T. 2409, 2419*]. After considering the parties' objections to this Original Report [*Court Ex. 1*] and following a hearing on their objections [*C.T. 2406, 2407, 2408, 2497, 2533, 2534, 2771*], the District Court modified the Special

Master's Original Report by interlineation and filed it [*C.T. 2285, 2534, 2771*]. While the Garbell plaintiffs bitterly opposed the modifications made to the Original Report and, in fact, asked the Court for summary judgment of validity of the '758 patent based on the Special Master's Original Report [*C.T. 2348, 2393, 2433, 2474, 2500*], the plaintiffs later presented the Court with evidence [*Exs. 695-11 and 695-11A; R.T. 2706, 2764*] which supports and justifies the modifications made by the District Court. The geometry findings of the Special Master set forth in the Original Report, as modified by the Court, are supported by the evidence presented to the Special Master and outlined by him in the Report. The Curtiss-Wright prior art wing geometry, as found by the Special Master, is covered by the claims of the '758 patent and anticipates those claims. 385 F.Supp. 1, 19. Thus, the trial before the Special Master, requested by plaintiffs, resulted in findings that rendered the '758 patent invalid. The Trial Court's modifications to the Original Report [*Court Ex. 1; R.T. 69*] are supported by plaintiffs' own evidence [*Exs. 695-11 and 695-11A; R.T. 2706, 2764*].

At the eventual trial before the Court in 1972, the plaintiffs offered no evidence contrary to that offered by defendants on the Curtiss-Wright prior art wings. Astonishingly, the Garbell plaintiffs placed into evidence, without limitation, an exhibit that, without more, supports the Special Master and District Court findings which invalidate the '758 patent by anticipation. [*Exhibits 695-1 through 695-71A, especially Exs. 695-11, 695-11A; R.T. 2697 to 2764.*]

The plaintiffs' evidence, an internal Curtiss memo, dated August 18, 1948, states:

"Subject: Garbell Patent 2,441,758. We know of no Curtiss-Wright airplane, *except* the prior art airplanes referred to below which could be construed as coming within the scope of his (Garbell's) patent." (*Exhibit 695-11; R.T. 2706, 2764.*)

This memo (*Exhibits 695-11, 695-11A; R.T. 2706, 2764*) outlines the Curtiss development and then goes on to fully verify that the CW-23 and the CW-21B wings anticipate the claims of the '758 patent. Plaintiffs' convincing evidence contained in this exhibit summarizes the depositions of former Curtiss engineers George A. Page taken in March, and again in June of 1967; Charles Hurkamp, taken in July of 1967; R. F. Driefke, taken in June of 1967; pilots: Ned Warren, taken in June of 1967 and William Nickey, taken in June of 1967; and summarizes the testimony before the Special Master in 1970, consisting of George A. Page, Wesley T. Butterworth, Prof. Pinkerton, Donald A. Schelp and Lyman D. Smith; refutes the lengthy Garbell testimony before the Special Master and summarizes the trial testimony of Butterworth.

Plaintiffs' evidence on the Curtiss-Wright prior art wings additionally states and proves:

"This wing was modified still further on two other Curtiss-Wright models, the 21B and 23, to a form which would appear to anticipate at least some of Garbell's claims. Attached hereto are reproductions of six pages of an Aerodynamics Report dated February 20, 1939 which discloses the form of the Model 23 wing. Because the new root section used in this model, designated the CW-

23 airfoil, had zero camber and the tip (the CW-19 section) had only slightly more camber than the airfoil at the splice (N.A.C.A. 2314), the camber at the latter was greater than that which would have resulted from straight line fairing between root and tip."

The memorandum was put into evidence without limitation [R.T. 2706, 2764] and proves that the Model 21-B and 23 wings had zero camber at the root as found by the Special Master and had the elements of claims 1, 2, 3 and 7 as found by the court. 385 F.Supp. 1, 20. The memo continued:

"There was also aerodynamic improvement along the lines referred to in Garbell's patent. This improvement (as recently computed from flight test data on the CW-23 airplane tabulated in 1939) indicates an increase in maximum lift. . ."

Also, while there appears to be no comparative flight test data directly on point, *it is understood that the flight characteristics of the 21B and 23 model were improved by reason of using the further modified wing.*" (*Exs. 695-11 and 695-11A; R.T. 2706, 2764.*)

Exhibits 695-11 and 695-11A; R.T. 2706, 2764 additionally prove that details and reports on the Curtiss Wright prior art wings were readily retrievable as late as 1948, and originals of proposals such as P-248 (*Ex. JX-19; R.T. 1233, 1248*) were available for use in Court in the '70s. For prior art use, the Curtiss-Wright Models 23 and 21-B have never been lost or forgotten.

The Curtiss-Wright prior art wings had an identity of elements, function, and result to that claimed by Garbell in the '758 patent in claims, 1, 2, 3 and 7. In view of all the evidence, the Court could not have found otherwise. [*Findings of Fact F1 through F22; 385 F.Supp. 1, 18-21.*]

**In 1971, the Garbell Plaintiffs Earnestly Set Out
to Avoid Trial.**

The plaintiffs in 1971 set out in earnest to avoid trial on validity.

On February 1, 1971, the Court set the cases for trial in the District Court for the actual determination of the issues of validity and infringement as well as the determination of the significance of the geometry findings of the Special Master [*C.T. 2407-2408*].

During the weeks before the trial, the plaintiffs filed several motions for continuance which were denied [*C.T. 2548; 2555; 2561; 2615; 2618; 2623; 2631*].

On May 5, 1971, the Special Master filed his Supplemental Report [*C.T. 2634*] and, on May 14, 1971, the plaintiffs took the occasion to move to remand for further findings by the Special Master claiming they were *surprised by their own evidence* presented to the Special Master and contained in the Supplemental Report [*C.T. 2708; 2733; 2741; 2778; 2801; 2833; 2929; 2934; 3485 et seq.*]. The Court granted their motion [*C.T. 2771; 2777; 2974*].

By June 1, 1971, the Garbell plaintiffs had successfully avoided a validity trial in these actions for eight years. On June 1, 1971, they were still unwilling to go to trial in the District Court on the issue of validity of the '758 patent, an issue common to both the Boeing action and the Douglas action.

In eight years, plaintiffs were not prepared to go to trial on the infringement allegations against Douglas. They had failed to assess their infringement allegations [*Ex. HT, p. 124; R.T. 774, 826, 1083*] and claimed they were surprised by their own evidence presented to the Special Master on the geometry of the allegedly infringing DC-8 wing [*C.T. 3485 et seq.*]. They had made no effort to assess their infringement allegations in the Boeing action in the eight years that case had been pending [*R.T. 858-859, 879-880; Ex. HT, p. 124; R.T. 774, 826, 1083*].

Unwilling to proceed to trial on the validity issue and unprepared to go to trial on the infringement issues, the Garbell plaintiffs attacked the Trial Judge personally for alleged bias and prejudice in a motion filed on the first day of trial, June 1, 1971 [*C.T. 2978, 2994, 3050*]. Amazingly, this assault on District Judge Hauk was filed just one year subsequent to their expressed desire filed with the District Court [*C.T. 2076-2077*] "that the Court hold these actions without further transfer" to a new judge. After urging the Trial Judge Hauk to "hold these actions" because they had been transferred so many times since 1963, the plaintiffs in 1971, used a recusal motion to hound the Court to transfer the cases.

On June 4, 1971, after three days of trial, the Garbell plaintiffs filed with the Ninth Circuit an all-out attack on the Trial Judge in a Petition for Writ of Mandamus (*Ninth Circuit Case No. 71-1856*).

The plaintiffs further prolonged a final adjudication of the validity of the '758 patent by applying for and obtaining a stay of the trial pending review of their Petition for Writ of Mandamus [*C.T. 3057*].

The plaintiffs' success was short-lived, their petition was denied the same day it was argued [*C.T.* 3062, 3063, 3065, 3067].

With very little success in the Ninth Circuit Court, the plaintiffs filed a Petition for Writ of Certiorari in the United States Supreme Court (*Case No. A-556, October Term, 1971*), asking for a stay in this Court, and not succeeding made a further try in the Ninth Circuit [*C.T.* 3285].

The Garbell Plaintiffs' Misconduct Is Unmistakable.

In the fall of 1971, after the stay of the Circuit Court was lifted, and the mandate went back to the District Court [*C.T.* 3062], the plaintiffs fired their two patent attorneys [*C.T.* 3102, 3106, 3128, 3133, 3146, 3160, 3171] and further prolonged the litigation in these cases. Plaintiffs represented to the Court that they had no competent patent counsel [*C.T.* 3321, 3330], and Morris Lowenthal, Esq., plaintiffs' counsel since 1965, stated that he was not competent to try these actions [*Hearing 9/10/71; C.T.* 2090; 3069; 3093; 3105]. Examples of the frustrations experienced by the Special Master [*C.T.* 3485 *et seq.*], the Trial Court, and the defendants in trying to move these cases to a final determination in trial before the District Court are, in part, set forth in the District Court's Preliminary Findings and Memorandum Decision [*C.T.* 3557, *et seq.*; and 385 *F.Supp.* 1, at 2 to 9, 37-38].

The conduct of the Garbell plaintiffs, their lack of cooperation and refusal to communicate with the Special Master, and their refusal to prepare for or attend a short evidentiary hearing on the remand sought by them and granted by the Court, caused the Special Master to report to the District Court as follows:

Special Master Letter No. 95, dated November 18, 1971:

"I concede also that I think the difficulty imposed upon any attorney or firm [defendants] required to stand by indefinitely, but always at the ready, pending plaintiffs' obtaining trial counsel they think adequate to the task, is utterly intolerable."

Special Master Letter No. 100, dated December 30, 1971:

"I cannot refrain from observing that the delays incurred in bringing this phase of the litigation to a close have been intolerable and are in large part attributable to unwarranted demands that counsel and Dr. Garbell be inconvenienced in the prosecution of the litigation which plaintiffs commenced."

The next letter from the Special Master was written at a time when these cases were simultaneously pending (1) hearing on the remand requested by the Garbell plaintiffs, (2) pending recommencement of the trial in the District Court, (3) in the Ninth Circuit seeking a second stay of trial of the actions [*C.T.* 3285] commenced by plaintiffs, and (4) in the United States Supreme Court on plaintiffs' Petition for Writ of Certiorari and their application to that Court for a stay.

Special Master Letter No. 102, dated February 1, 1972:

". . . We have the astounding situation in which: plaintiffs desire to defer indeterminately any hearing pertaining to the geometry issues which, by their motion and the Court's order, were made

a matter of reference to me as Special Master; and defendants are anxious to have the matter heard and determined at the earliest possible time. My own view of the matter is that plaintiffs' counsel are entirely competent to represent plaintiffs in the action, that there are no serious prospects to (if, indeed, there are any serious endeavors to obtain), substitute counsel for plaintiffs and that, if plaintiffs' counsel have the time and energy to generate the copious paperwork recently filed with the respective clerks of the District Court, the Court of Appeals and the Supreme Court, they can find the time and energy to attend a short hearing before me."

The plaintiffs, in February of 1972, then had put the defendants in this position: (1) the defendants had to prepare the trial set to recommence on March 7th, knowing all the while that plaintiffs would apply for, and possibly obtain, a stay of trial in the United States Supreme Court and (2) the defendants were forced at the same time to prepare for the scheduled Special Master hearing, even though plaintiffs had no intention of showing up.

On February 14, 1972, the Supreme Court denied the plaintiffs' stay application and, eventually, denied certiorari. The remand to the Special Master was vacated [*C.T.* 3325, 3485] and plaintiffs showed up for trial with Mr. George B. White and Mr. Morris Lowenthal as attorneys of record.

Trial recommenced on March 7, 1972, and concluded on June 2, 1972. The trial which commenced June 1, 1971, was finally completed June 2, 1972, including final argument by both parties. The Court, in consider-

able detail, rendered a tentative decision from the Bench on June 2, 1972. [*R.T. of June 2, 1972, C.T.* 3484.]

Proposed findings were submitted to the Court by defendants, objections to these proposed findings were filed by plaintiffs.

On September 14, 1973, defendants filed a notice of motion and motion *re* amount of attorneys' fees to be awarded to defendants. [*C.T.* 3496.]

Hearing on defendants' motion, plaintiffs' objections to that motion [*C.T.* 3508, 3517] and defendants' reply to the objections [*C.T.* 3522] was heard on October 1, 1973 [*C.T.* 3556]. At the Hearing, defendants presented testimony of Herbert A. Huebner, Esq. Mr. Huebner testified that these cases are "exceptional" within the meaning of 35 U.S.C. Section 285, and that \$850,000 is reasonable attorneys' fees for the 18,525 hours in legal work necessarily performed by the firm, Hahn, Cazier, Hoegh & Leff, in the defense of these actions [*R.T. Oct. 1, 1973*].

Thereafter, the Trial Court modified the proposed Findings of Fact and Conclusions of Law, and made its own Preliminary Findings and Memorandum Decision. (385 *F.Supp.* 1 through 57).

Final Judgment was filed and entered in both cases pursuant to Rule 54(b) of the Federal Rules of Civil Procedure [*C.T.* 3731].

The District Court made Findings on the "Justification for an Award of Attorneys' Fees" (385 *F.Supp.* 1, at 37); and concluded from these findings and the testimony of Mr. Huebner [*R.T.* 10/1/73] that these cases are "exceptional" within the meaning of 35 U.S.C. Section 285 (385 *F.Supp.* 1, at 44).

In Garbells' Motion to Alter or Amend the Judgment [C.T. 3732, 3742] they were not seeking relief from the judgment of invalidity of the '758 patent. In their motion and proposed order amending judgment, the plaintiffs were willing to accept the judgment of attorneys' fees, but asked the District Court to reduce the award of "reasonable" attorneys' fees to defendants to \$2,500.00.

Since the Garbell corporations' major asset is the '758 patent which expired in 1965 [C.T. 170] and was never commercially exploited during its life, it is unlikely that defendants could ever be compensated by the Garbell plaintiffs for costs alone, much less collect an award of attorneys' fees for the 18,525 hours in legal work and litigation necessarily incurred and performed in the defense of these two cases from 1965 through 1973. The \$850,000.00 in attorneys' fees for the 18,525 hours in legal work by defense counsel, Hahn, Cazier, Hoegh & Leff, was reduced by the District Court to one-fourth the amount prayed for by defendants. The award of "reasonable" attorneys' fees is now fixed in the amount of \$237,062.50 by the District Court. The Garbell patentees cannot now be heard to say that the decision of invalidity should not stand or that these cases are not "exceptional".

REASONS FOR DENYING CERTIORARI.
The Courts Know an "Exceptional" Case When They See One.

35 United States Code §285 could not be simpler:

"The court in exceptional cases may award reasonable attorney fees to the prevailing party."

Section 285 needs no restatement by this Court. The courts below *know* an "exceptional" case when they see one. In finding cases to be "exceptional", the courts follow well established principles laid down by this Court.

The facts make the present actions "exceptional":

1. Dr. Garbell owed a duty to the Patent Office to make a full and fair disclosure of all facts affecting the patentability of his "Garbell Wing" invention, and Dr. Garbell breached his duty;

2. Dr. Garbell suppressed from the Patent Office relevant evidence of prior printed publications describing the "Garbell Wing" incorporated in the Pinguino sailplane, and signed an oath that the claimed invention had not been described in printed publications; although he himself described the alleged invention in printed publications in the late '30s;

3. Dr. Garbell went into the CVAC action with "unclean hands", and deliberately misled District Court Judge Yankwich in obtaining a validity decree in *Maurice A. Garbell, Inc. v. Consolidated Vultee Aircraft Corporation, et al.*, 94 F.Supp. 843 (D.C. Cal. 1950), reversed 204 F.2d 946, cert. denied 346 U.S. 873, 74 S.Ct. 122;

4. The Garbell plaintiffs came into these actions with "unclean hands", and have made use of the

CVAC decree obtained by Dr. Garbell's false testimony in the CVAC action;

5. The Garbell plaintiffs did not make a reasonable assessment of their allegations of infringement prior to filing suit in these actions to enforce an obviously invalid patent, and refused to assess their infringement allegations when ordered by the Special master to do so;

6. The Garbell plaintiffs "improvidently brought" these actions in 1963, they unduly and deliberately fought against going to trial, and they unduly prolonged these actions far beyond any concept of a civil case in any court, let alone a federal court.

From the facts presented in these actions, the trial court found, "N17. The conduct of plaintiffs as outlined in these findings is wholly unjustified and amounts to bad faith. It would be unconscionable to require defendants to bear the burden of their defense cost." (*Maurice A. Garbell, Inc. v. Boeing Company*, 385 F.Supp. 1, 38 (D.C. Cal. 1973).

In Finding Cases to Be "Exceptional", the Courts Below Follow Well Established Principles Laid Down by This Court.

In affirming the trial court in these actions, the Ninth Circuit Court of Appeals followed well established law as laid down by this Court:

"A patent applicant owes a duty to the patent office to make a full and fair disclosure of all facts which may affect the patentability of his invention. *Precision Instruments Manufacturing Co. v. Automotive Maintenance Machinery Co.*, 324 U.S. 806, 818, 65 S.Ct. 993, 89 L.Ed. 1381 (1945). A breach of that duty is relevant not

only in determining the validity of the patent but also the good faith of the applicant in maintaining subsequent infringement actions. *Monolith Portland Midwest Co. v. Kaiser Aluminum and Chemical Corp.*, 407 F.2d 288 (9th Cir. 1969); *Kramer v. Duralite Company, Inc.*, 514 F.2d 1076, 1077 (2nd Cir. 1975)." *Maurice A. Garbell, Inc. v. Boeing Co.*, 546 F.2d 297, 300 (9th Cir. 1976).

As stated by this Court:

"A patent by its very nature is affected with a public interest. As recognized by the Constitution, it is a special privilege designed to serve the public purpose of promoting the 'Progress of Science and useful Arts.' At the same time, a patent is an exception to the general rule against monopolies and to the right to access to a free and open market. The far-reaching social and economic consequences of a patent, therefore, give the public a paramount interest in seeing that patent monopolies spring from backgrounds free from fraud or other inequitable conduct and that such monopolies are kept within their legitimate scope." *Precision Instrument Mfg. Co. et al. v. Automotive Maintenance Machinery Co.*, 324 U.S. 806, at 816, 65 S.Ct. 993, 89 L.Ed. 1381 (1945). "(I)t is clear that Automotive knew and suppressed facts that, at the very least, should have been brought in some way to the attention of the Patent Office, especially when it became evident that the interference proceedings would continue no longer. Those who have applications pending with the Patent Office or who are parties

to Patent Office Proceedings have an uncompromising duty to report to it all facts concerning possible fraud or unequity underlying the applications in issue. *Cf. Crites, Inc. v. Prudential Ins. Co.*, 322 U.S. 408, 415, 64 S.Ct. 1075, 1079, 88 L.Ed. 1356. This duty is not excused by reasonable doubts as to the sufficiency of the proof of the inequitable conduct nor by resort to independent legal advice. Public interest demands that all facts relevant to such matters be submitted formally or informally to the Patent Office, which can then pass upon the sufficiency of the evidence. Only in this way can that agency act to safeguard the public in the first instance against fraudulent patent monopolies. Only in that way can the Patent Office and the public escape from being classed among the 'mute and helpless victims of deception and fraud.' *Hazel-Atlas Glass Co. v. Hartford-Empire Co.*, 322 U.S. 238, 246, 64 S.Ct. 997, 1001, 88 L.Ed. 1250." *Precision Instrument Mfg. Co. et al. v. Automotive Maintenance Machinery Co.*, 324 U.S. 806, 818, 65 S.Ct. 993, 999, 89 L.Ed. 1381 (1945).

The facts in these actions and the testimony of Garbell himself, as highlighted herein, prove that the "Garbell Wing" monopoly springs from a "background" saturated with Garbell's bad faith and willful acts of inequitable conduct; if not, indeed, fraud itself.

The Equitable Powers of This Court Can Never Be Exerted in Behalf of One Who Has Acted Fraudulently or Who by Deceit or Any Unfair Means Has Gained an Advantage. To Aid a Party in Such a Case Would Make This Court the Abettor of Iniquity.

Contrary to the Garbell Petitioners' statement (*Pet.*, p. 8), that the trial court "did not find that the acts of Dr. Garbell before the Patent Office were wrongful or willful or that there was any fraud on the Patent Office"; in a detailed tentative decision [*R.T. June 2, 1972, pp. 181-210*], the trial court stated: (1) that Dr. Garbell sat down and claimed all the prior art in his patent application as a method of extorting monies from the aircraft manufacturers [*R.T. 198*]; (2) that Dr. Garbell did not disclose to the Patent Office the prior art Pinguino or Arcore sailplanes [*R.T. 198-199*]; (3) that Dr. Garbell did not disclose to the Patent Office the prior art printed publications describing the Pinguino sailplane wing [*R.T. 198-199*]; (4) that Dr. Garbell's suppression of the prior art printed publications from the Patent Office was "some indication of fraud upon the Patent Office" [*R.T. 198*]; (5) that Dr. Garbell's testimony in these actions is contrary to his testimony before Judge Yankwich in the CVAC case [*R.T. 198-199*]; (6) that "I do feel that Judge Yankwich did not have all the evidence before him as I do". "If he had, I think Judge Yankwich might well hold the patent invalid as I am doing." [*R.T. 199*]; (7) that the Garbell plaintiffs "improvidently brought" these

actions [R.T. 209]; (8) that the Garbell plaintiffs unduly prolonged these actions far beyond any concept of a civil case in any court, let alone a Federal Court [R.T. 209]; and (9) that the Garbell "plaintiffs unduly and deliberately fought against going to trial although they were plaintiffs" [R.T. 209].¹

As noted by the Ninth Circuit Court of Appeals (*Maurice A. Garbell, Inc. v. Boeing Co.*, 546 F.2d 297, 299-300),

"The court found that the essence of the Garbell Wing had been published and was well known more than one year prior to his patent application. This knowledge was imparted through reports and publications by *Garbell himself* as well as by other aeronautical engineers and the National Advisory Committee on Aeronautics."

* * *

"Additionally, the court found that the Garbell Wing was on sale more than one year prior to the date of the patent application and that *Garbell actively participated in those sales efforts.*"

* * *

"Specifically, the court found that *Garbell had misled the patent office* by suppressing relevant evidence of prior publications, 385 F.Supp. at 38 (Findings N13-N15, N17) . . .". *Maurice A. Garbell, Inc. v. Boeing Co.*, 546 F.2d 297, 299-300 (9th Cir. 1976).

The trial court found that Garbell's conduct in the Patent Office, "is below the standards of good faith

¹Judge Yankwich's quotation in *Maurice A. Garbell, Inc. v. Consolidated Vultee Aircraft Corp.*, 94 F.Supp. 843, 845 applies to Dr. Garbell's conduct throughout. "(L)ike the 'damned spot' in Macbeth, will not 'out', for all adjurations."

and candor required of inventors dealing with the Patent Office". *Maurice A. Garbell, Inc. v. Boeing Company*, 385 F.Supp. 1, 38 (D.C. Cal. 1973), and:

"N17. The conduct of plaintiffs as outlined in these findings is wholly unjustified and amounts to bad faith. It would be unconscionable to require defendants to bear the burden of their defense cost." *Maurice A. Garbell, Inc. v. Boeing Company*, 385 F.Supp. 1, 38 (D.C. Cal. 1973).

As this Court declared:

"Any willful act concerning the cause of action which rightfully can be said to transgress equitable standards of conduct is sufficient cause for the invocation of the maxim by the chancellor." *Precision Instrument Manufacturing Co. v. Automotive Maintenance Machinery Co.*, 324 U.S. 806, 815, 65 S.Ct. 993 (1945).

The Eighth Circuit authority relied upon by the Garbell patentees (Pet., pp. 3, 10, 11, 16) is not in conflict with these basic premises. As must be obvious to all, the Garbell patentees' conduct has been "willful" throughout. *Pfizer, Inc. v. International Rectifier Corp.*, 538 F.2d 180 (8th Cir. 1976).

The trial court in the present actions noted Dr. Garbell's testimony before District Court Judge Yankwich in obtaining the earlier CVAC decree when "shop rights" was an issue:

"*THE COURT*: The question is whether it was fraud or gross negligence on the Patent Office, not on the court. *The only fraud that I felt that was practiced on the court was that Garbell, down in the Yankwich case testified, (1) namely*

that at Convair he didn't have anything to do with Convair aircraft; whereas, in this court he testified under oath that he did—he had everything to do with it." [R.T. October 1, 1973, pp. 22-23, *Hearing on defendants' motion for attorney fees*].

This conduct alone would be sufficient for finding a case to be "exceptional" within the meaning of 35 U.S.C. §285. *Skil Corporation v. Lucerne Products, Inc.*, 503 F.2d 745 (C.A. Ill. 1974), *cert. denied* 420 U.S. 974, 95 S.Ct. 1398.

Commencing with his misconduct in the Patent Office in 1946, Dr. Garbell has left an unmistakable trail. In 1950, Garbell deliberately misled District Court Judge Yankwich in obtaining the CVAC decree. After filing the present actions in 1963, the Garbell patentees have used the CVAC decree at every opportunity [C.T. 328-386, 654, 1560, 1594, 1913-1915] as a form of *estoppel* against defendants to assert the *obvious invalidity* of the patent in suit and the *bad faith* of the Garbell plaintiffs throughout. The Garbell plaintiffs have used the CVAC decree to move themselves into an advantageous position to which they are not entitled in view of Garbell's testimony in the CVAC action.

To this day, the Garbell petitioners are using the CVAC decree in order to gain an unfair advantage over defendants (*Pet. for Writ of Cert.*, pp. 3, 4, 6, 8, 9, 11, 12, 16). The Garbell petitioners state, in essence, that since the Ninth Circuit Court of Appeals, in reversing the CVAC case, "did not tell the patent holders that they did not possess a valid patent", that they came into these actions in good faith (*Pet.*, p. 11). The Garbell petitioners urge this Court to believe that there had been a full and fair

prior adjudication of the validity of the Garbell patent in suit (in the CVAC action) which *they know to be untrue*.

The Garbell patentees' use of the early CVAC decree in the present actions [C.T. 328-386, 654, 1560, 1594, 1913-1915], obtained by Garbell's suppression from Trial Judge Yankwich in the CVAC action pertinent facts affecting the validity of the '758 parent patent, brings the present actions directly within the rule announced by this Court:

"The actual use made of that decree is sufficient to show that plaintiff did not come with clean hands in respect of any cause of action in these cases." *Keystone Driller Company v. General Company*; *Keystone Driller Company v. Osgood Company*, 290 U.S. 240, 247 (1933), 54 S.Ct. 146, 78 L.Ed. 293.

The trial court's findings that, "Defendants are not bound by the trial court decision in the CVAC case and are not estopped to assert invalidity of the patent in suit" (*FF M1-M11*, 385 F.Supp. 1, 36-37), and that, "The actions were not filed or maintained in good faith" (*FF N2*, 385 F.Supp. 1, 37), are consistent with the law laid down by this Court.

This Court has declared:

"It is a principle in chancery, that he who asks relief must have acted in good faith. The equitable powers of this court can never be exerted in behalf of one who has acted fraudulently or who by deceit or any unfair means has gained an advantage. To aid a party in such a case would make this court the abetter of iniquity." *Bein v. Heath*, 6 How. 228, 247.

It Would Be Unconscionable to Require Defendants to Bear the Burden of Their Defense Expenditures.

The law is well established that the trial court's discretion in awarding attorney fees in patent cases may be invoked only upon a finding of bad faith or inequitable conduct on the part of the losing party which would make it grossly unjust for the prevailing party to be left with the burden of his litigation expenses. *Purer & Co. v. Aktiebolaget Addo*, 410 F.2d 871 (9th Cir.), *cert. denied* 396 U.S. 834, 90 S.Ct. 90, 24 L.Ed.2d 84 (1969); *Rohr Aircraft Corporation v. Rubber Teck, Inc.*, 266 F.2d 613, 624 (9th Cir. 1959); *Park-In Theaters, Inc. v. Perkins*, 190 F.2d 137, 142 (9th Cir. 1951).

The trial court in these actions found:

"N17. The conduct of plaintiffs as outlined in these findings is wholly unjustified and amounts to bad faith. It would be unconscionable to require defendants to bear the burden of their defense cost." *Maurice A. Garbell, Inc. v. Boeing Company*, 385 F.Supp. 1, 38 (D.C. Cal. 1973).

The findings of Dr. Garbel's bad faith in securing the patent monopoly (1) by suppressing from the Patent Office relevant evidence of prior publications, and (2) signing an oath that the claimed invention had not been described in printed publications (*FF N13-N15, N17*; 385 F.Supp. 1, 38) are an adequate foundation for deciding that these cases are "exceptional" within the meaning of 35 U.S.C. Section 285. *Monolith Portland Midwest Co. v. Kaiser Aluminum and Chemical Corp.*, 407 F.2d 288 (9th Cir. 1969); *Shelco Inc.*

v. Dow Chemical Co., 466 F.2d 613 (7th Cir. 1972); *Kahn v. Dynamics Corp. of America*, 508 F.2d 939 (2nd Cir. 1974), *cert. denied* 421 U.S. 930, 95 S.Ct. 1657, 44 L.Ed.2d 88 (1975).

Plaintiffs Brought These Actions With Full Knowledge of the Obvious Invalidity of the Garbell Patent.

The trial court in these actions found:

"N2. The actions were not filed or maintained in good faith."

* * *

"N11. From the evidence offered by the plaintiffs, without limitation in Exhibits 686 and 695, the plaintiffs knew that [the] patent was invalid and yet continued to pursue the action." *Maurice A Garbell, Inc. v. Boeing Company*, 385 F.Supp. 1, 37-38 (D.C. Cal. 1973).

These actions are "exceptional" since the Garbell plaintiffs brought the actions with full knowledge of the obvious invalidity of the patent in suit. *Tidewater Patent Development v. Kitchen*, 371 F.2d 1004 (4th Cir. 1967), *cert. denied* 389 U.S. 821, 88 S.Ct. 46, 19 L.Ed.2d 74. Bringing an infringement suit to enforce an obviously invalid patent is evidence of bad faith. *Talon v. Union Slide Fastener*, 266 F.2d 731 (9th Cir. 1959); *Shingle Product Patents v. Gleason*, 211 F.2d 437 (9th Cir. 1954).

The Circuit Courts are consistent in holding cases such as these to be "exceptional" within the meaning of 35 U.S.C. §285 where it is found that the misconduct arose in securing the patent and in conducting litigation

after securing the patent. *L. F. Strassheim Co. v. Gold Metal Folding Furniture*, 477 F.2d 818 (7th Cir. 1973); *Penn Yan Boats, Inc. v. Sea Lark Boats*, 359 F.Supp. 948 (D.C. Fla. 1972), *aff'd per curiam* 479 F.2d 1328 (5th Cir. 1973), *cert. denied* 414 U.S. 874, 94 S.Ct. 66, 38 L.Ed.2d 115.

The Garbell plaintiffs had Exhibits 695-1 through 695-71A [C.T. 2703, 2764] in their possession since 1967. By putting those exhibits into evidence, without limitation, the plaintiffs added to the proof that (1) the claims of the patent in suit were anticipated by the Curtiss-Wright Models 21B and 23 aircraft wings; (2) the subject matter of the patent was obvious to one skilled in the art, and "was merely an aggregation of general knowledge and formulae that had been available to designers for many years as well as published by the NACA"; (3) the claims cover devices which were old and unpatentable over the prior art; (4) that the prior art asserted by the defendants in the CVAC case was good prior art in the 1950 trial, and was still good prior art; and (5) that the patent should have been adjudicated invalid and anticipated by the Curtiss-Wright Models 21B and 23 aircraft wings in the CVAC action. Notwithstanding, the Garbell plaintiffs pressed on, causing the defendants the litigation expense in proving what the Garbell plaintiffs knew beyond any doubt—that the patent was obviously invalid. The trial court found that:

"N8. The plaintiffs denied requests for admissions directed to the airfoil section parameters, including mean-line camber of the prior art Curtiss-Wright Models 21B and 23 aircraft. Issues as to the shape of such wings were tried by the Special Master and the Special Master made his

findings with respect to such parameters. Plaintiffs objected to such findings before the Court trial; then at the trial, plaintiffs introduced documentary evidence which substantiated fully the Special Master's findings as to the wing geometry of those aircraft, and also proved that the Models 21B and 23 wings showed aerodynamic improvements over previous Curtiss-Wright models. That the Curtiss-Wright Models 21B and 23 aircraft invalidate Claims 1, 2, 3 and 7 of the patent in suit appears elsewhere in these findings and in the Conclusions of Law."

* * *

"N9. Plaintiffs put in evidence opinions that the patent in suit was anticipated."

* * *

"N10. Plaintiffs put in evidence that a description of a wing design covered by the patent was circulated in the NACA, a public body, before the earliest date the patentee can claim as a reduction to practice, i.e. the filing date of the patent application." *Maurice A. Garbell, Inc. v. Boeing Company*, 385 F.Supp. 1, 37-38 (D.C. Cal. 1973).

In applying 35 U.S.C. §285, Judge Stevens stated:

"The award in this case is supported not only by the patentee's failure to verify or disclose critical facts at the time of application, but also by the same considerations that underlie the authorization of sanctions for failure to make discovery. See Rule 37, Fed.R.Civ.P." *L. F. Strassheim Co. v. Gold Metal Folding Furniture Co.*, 477 F.2d 818, 824 (7th Cir. 1973).

The Garbell Plaintiffs Did Not Make a Reasonable Assessment of the Possibilities of Infringement Before Bringing Suit, or to Date.

In 1964, again under oath in deposition, Garbell testified that prior to filing these actions, he had never compared the claims of his patent to the accused aircraft wings [Ex. HT, p. 124; R.T. 774, 826, 1083]. In 1971, eight years later, they had made no effort to assess their infringement allegations in the Boeing action [R.T. 858-859, 879-880], and they refused to assess their infringement allegations against Douglas [Maurice A. Garbell, Inc. v. Boeing Co., 385 F.Supp. 1, 2-9, 37-38; C.T. 3485 et seq.].

The Garbell plaintiffs cannot now rely on the DC-8 wing for any purpose. There was no trial on the infringement issue in the District Court—plaintiffs saw to that [C.T. 3485 et seq.; Maurice A. Garbell, Inc. v. Boeing Co., 385 F.Supp. 1, 3-5, 56-57]. The Garbell plaintiffs claimed they were “surprised by their own evidence” presented to the Special Master and contained in the Supplemental Report [C.T. 2634 et seq., 2708, 2733, 2741, 2778, 2801, 2833, 2929, 2934; See Second Supplemental Report of the Special Master and Recommendation that the Order of Remand to the Special Master be Rescinded, at C.T. 3485 et seq.]. The geometry findings on the DC-8 wing, contained in the Supplemental Report of the Special Master [C.T. 2634 et seq.] prove there is no infringement, and plaintiffs refused to prepare for or attend a hearing on the remand sought by them and granted by the Court [C.T. 3485 et seq.].

From the evidence, outlined herein, the trial court found:

“N16. The plaintiffs had no meaningful evidence upon which to base their allegations of infringement prior to filing the complaints in these actions. They opposed Boeing’s request for an early trial on the Boeing infringement issue. Plaintiffs refused to go to trial on the remand to the Special Master for additional findings on the Douglas infringement issue, after they discovered his initial findings were unfavorable to them. Plaintiffs presented evidence in this trial which they have had in their possession since 1967, and which would support a finding that the patent was invalid.” (Maurice A. Garbell, Inc. v. Boeing Company, 385 F.Supp. 1, 38).

The trial court additionally found that (1) the plaintiffs failed to use reasonable care in assessing their allegations of infringement against Boeing; (2) plaintiffs had not sought to go to trial on the issue of infringement in the Boeing case throughout the lengthy history of the case; (3) plaintiffs moved for summary judgment of willful infringement against Douglas with respect to the DC-9 aircraft wing, and a few months later dropped any claim based on the DC-9 wing; (4) plaintiffs’ failure to furnish evidence supporting their infringement allegations against Douglas with respect to the DC-8 airplane wings, though repeatedly requested by the Special Master to do so, was irresponsible and inexcusable; and (5):

“N12. Plaintiffs have used the patent in an attempt to exact undue tribute from the two defendants.” (Maurice A. Garbell, Inc. v. Boeing Company, 385 F.Supp. 1, 37-38; FF N3, N4, N5, N6, N7, N12).

The Circuit Courts are consistent in holding cases such as these to be "exceptional" within the meaning of 35 U.S.C. §285 where the allegation of infringement is frivolous and/or asserted without reasonable care and sufficient justification. *Talon, Inc. v. Union Slide Fastener, Inc.*, 266 F.2d 731 (9th Cir. 1959); *Kaehni v. Diffraction Co., Inc.*, 342 F.Supp. 523 (D.C. Md. 1972), *aff'd*, 473 F.2d 908 (4th Cir. 1973), *cert. denied* 414 U.S. 854, *rehearing denied* 414 U.S. 1033.

"[I]f obvious invalidity can serve as an indication of bad faith, the obvious absence of infringement should serve even more forcefully to indicate bad faith." *Kaehni v. Diffraction Co., Inc.*, 342 F. Supp. 523, 536, *aff'd per curiam* 473 F.2d 908 (4th Cir. 1973), *cert. denied* 414 U.S. 854, *rehearing denied* 414 U.S. 1033.

The Garbell Plaintiffs Unduly Prolonged These Actions Far Beyond Any Concept of a Civil Case in Any Court, Let Alone a Federal Court.

The trial court, in its tentative decision on June 2, 1972 [*R.T. June 2, 1972, pp. 181-210*], stated that the Garbell plaintiffs "improvidently brought" these actions, that the "plaintiffs unduly and deliberately fought against going to trial, although they were plaintiffs", and that the Garbell plaintiffs "unduly prolonged these actions far beyond any concept of a civil case in any court, let alone a Federal Court". [*R.T. 6/2/72, p. 209*]. The trial court specifically found:

"N1. The plaintiffs before-trial proceedings in this action make this case one that is extraordinary."

"N2. The actions were not filed or maintained in good faith."

"N12. Plaintiffs have used the patent in an attempt to exact undue tribute from the two defendants." (*Maurice A. Garbell, Inc. v. Boeing Company*, 385 F.Supp. 1, 37-38).

The trial court's Preliminary Findings and Memorandum Decision (*Maurice A. Garbell, Inc. v. Boeing Company*, 385 F.Supp. 1, 2-9), reveal the frustrations experienced by the Special Master, the trial court, and the defendants in trying to move these cases to a final determination in trial before the District Court.

"Plaintiffs proceeded on the barest minimum of allegations sufficient to keep factual issues alive and avoid the numerous motions . . . The eccentricities of federal pleading generally, and patent law particularly, permitted this case to survive . . . years of discovery and proceed to trial." *Kaehni v. Diffraction Company*, 342 F.Supp. 523, 532 (D.C. Md. 1972), *aff'd per curiam* 473 F.2d 908 (4th Cir. 1973), *cert. denied* 414 U.S. 854, *rehearing denied* 414 U.S. 1033.

"The Federal Rules of Civil Procedure permit minimal pleadings, and a complaint will survive motions to dismiss and summary judgment so long as the plaintiff has salvaged a single 'genuine issue as to any material fact'. In patent cases the issue of infringement is not such as can be ferreted out as frivolous without going into a detailed investigation which would tend to defeat the purposes of the federal rules. The parties must be trusted to act responsibly. See Fed.R.Civ. P. 11." *Kaehni v. Diffraction Company*, 342 F.Supp. 523, 536, *aff'd per curiam* 473 F.2d 908 (4th Cir. 1973), *cert. denied* 414 U.S. 854, *rehearing denied* 414 U.S. 1033.

The Circuit Courts are consistent in holding that: "[W]here a case is 'exceptional' for proper reasons, prolongation of the case even if resulting from counsel's conduct, is properly considered in determining the amount of fees to be awarded." *Kaehni v. Diffraction Company*, 342 F.Supp. 523, 537 (D.C. Md. 1972); 473 F.2d 908 (4th Cir. 1973), cert. denied 414 U.S. 854, rehearing denied 414 U.S. 1033. See also *Monolith Portland Midwest Co. v. Kaiser Aluminum & Chemical Corp.*, 407 F.2d 288 (9th Cir. 1969).

The trial court expressly found that, "The conduct of plaintiffs as outlined in these findings is wholly unjustified and amounts to bad faith" and, "Such conduct warrants an award of reasonable attorneys fees which are fixed in the amount of \$237,062.50, the Court finding that counsel for defendants have reasonably expended 18,525 hours in the legal work and litigation necessarily incurred and performed in the proper and adequate defense of this action". (*Maurice A. Garbell, Inc. v. Boeing Company*, 385 F.Supp. 1, 38; FF N17 & N18). In affirming the Ninth Circuit Court of Appeals stated:

"The trial court's findings of bad faith are supported by the record and are not clearly erroneous. We agree with the trial court that this is an 'exceptional' case which justifies the award of attorney's fees under 35 U.S.C. §285.

"The award of \$237,062.50 in attorney's fees is one of the largest reported awards under 35 U.S.C. §285. However, in light of the extraordinary length of time (ten years) that was consumed by these proceedings and the necessarily great number

of hours expended on behalf of the defendants by their counsel,¹⁰ we cannot say that this award is excessive or unreasonable." *Maurice A. Garbell, Inc. v. Boeing Co.*, 546 F.2d 297, 300-301 (9th Cir. 1976).

In the Garbell plaintiffs' Motion to Alter or Amend the Judgment [C.T. 3732, 3742], plaintiffs were willing to accept the judgment of invalidity of the '758 patent and the judgment of attorney's fees in a reduced amount of \$2,500; at the same time representing to the trial court, in an Affidavit, that the total assets of each plaintiff corporation were Four dollars (\$4.00) [C.T. 3742-3745]. The Garbell petitioners' suggestion (*Pet.*, pp. 2, 10, 16) that the award of attorney's fees pursuant to 35 U.S.C. §285 punishes them is not well taken. The trial court found:

"N17. The conduct of plaintiffs as outlined in these findings is wholly unjustified and amounts to bad faith. *It would be unconscionable to require defendants to bear the burden of their defense cost.*" *Maurice A. Garbell, Inc. v. Boeing Co.*, 385 F.Supp. 1, 38.

The purpose for the award under §285 is to "reasonably" compensate defendants for their efforts in succeeding in invalidating the obviously invalid Garbell '758 patent. If the Garbell plaintiffs want to litigate (CVAC action) and relitigate (the present actions) an obviously invalid patent, then they alone should bear the litigation expenses when they do not prevail.

¹⁰These proceedings began in 1963 and took over ten years to complete, even excluding the time consumed by this appeal. The court found that counsel for the defendants reasonably expended 18,525 hours on this case."

Section 285 of 35 U.S.C. needs no restatement by this Court. The courts below *know* an "exceptional" case when they see one. In finding the present actions to be "exceptional", the courts below followed well established principles laid down by this Court.

Many Bases Exist Under Each Code Section for Finding the Garbell Patent Invalid.

The district court held that the '758 parent patent in suit did not meet the test of novelty and utility as required by 35 U.S.C. Section 101; it was anticipated by prior art and thus was invalid under 35 U.S.C. Section 102(a); the invention had been on sale and in public use more than one year prior to the date of the application for the patent as contemplated by 35 U.S.C. Section 102(b); the subject matter of the patent was obvious to one skilled in the art and thus the patent was invalid under 35 U.S.C. Section 103; and the teachings of the patent were insufficient and the claims ambiguous under 35 U.S.C. Section 112.

Unequivocal, Clear and Convincing Evidence Was Presented to the Trial Court. The Evidence Fully Supports the District Court's Findings of Fact. The Correct Law Was Properly Applied to the Findings of Fact. The District Court's Findings of Fact and Conclusions of Law Fully Support Its Judgment.

Unequivocal, clear and convincing evidence was presented to the trial court. The evidence fully supports the district court's findings of fact. The correct law was properly applied to the findings of fact. The district court's findings of fact and conclusions of law fully support its judgment. In affirming the trial court, the Ninth Circuit Court of Appeals stated:

"In reaching its findings, the court relied upon evidence produced in lengthy proceedings which included the testimony of several expert witnesses and the interpretation of numerous scientific exhibits. Unless found to be clearly erroneous, the findings of the district court must be upheld. Fed. R.Civ.P. 52(a); *Tri-Tron International v. A.A. Velto*, 525 F.2d 432 (9th Cir. 1975); *W. S. Shamban and Co. v. Commerce and Industry Insurance Co.*, 475 F.2d 34 (9th Cir. 1973)." *Maurice A. Garbell, Inc. v. Boeing Co.*, 546 F.2d 297, 299.

The Ninth Circuit Court of Appeals specifically stated that they had reviewed the evidence which had taken the parties one year to designate, assemble and supplement for that court's review:

"After a review of the record in this case, we cannot say that these findings are clearly erroneous. Since the district court applied the correct law to the findings, we must affirm the judgment as to the invalidity of this patent." *Maurice A. Garbell, Inc. v. Boeing Co.*, 546 F.2d 297, 299 (1976).

The district court announced its tentative decision in detail from the bench [*R.T. June 2, 1972, C.T. 3484*], post-trial summary of facts were supplied [*C.T. 3387 et seq.*], proposed findings were submitted to the court, objections to the proposed findings were filed by plaintiffs, record support for the findings was supplied to the court [*C.T. 3528-3554*]. Thereafter, the trial court modified the proposed findings of fact and conclusions of law, and made its own preliminary findings and memorandum decision (*Maurice A. Gar-*

bell, Inc. v. Boeing Company, 385 F.Supp. 1, 2-57). The findings meet all of the requirements of *United States v. El Paso Natural Gas Co.*, 376 U.S. 651, 84 S.Ct. 1044.

Many bases exist under each code section for finding the patent invalid (*Maurice A. Garbell, Inc. v. Boeing Company*, 385 F.Supp. 1, 2-39). The law laid down by this Court under each code section was properly applied here and there is no conflict among the Circuit Courts of Appeals, all of which is apparent from the case citations appearing in the Conclusions of Law (385 F.Supp. 1, 39-44).

The Garbell Patent in Suit Did Not Meet the Test of Novelty and Utility as Required by 35 U.S.C. §101.

Title 35 United States Code §101 states:

"§101 *Inventions Patentable*. Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title. July 19, 1952, c. 950, § 1, 66 Stat. 797."

The Garbell patent in suit and its claims do not meet the test of novelty and utility within the meaning of 35 U.S.C. §101 and are therefore invalid.

The Garbell '758 patent in suit never enjoyed any commercial success during its life; it died of old age in the Federal Courthouse on May 18, 1965, twelve years ago. No one paid to license the '758 patent; in fact, every airframe manufacturer in the United States and Great Britain that was approached, told the Garbell plaintiffs that the subject matter was old

and unpatentable [C.T. 788-791.] Twelve years ago when the '758 patent had but a mere three months to run before expiring, the Garbell plaintiffs, in a final burst of generosity, gave a royalty-free license to the government [R.T. 3567]. There is no evidence that the government or anyone ever constructed a wing by following the '758 patent.

The primary policy of the patent laws is to promote invention for the benefit of the public. Private gain is secondary.

Pennock v. Dialogue, 2 Pet. 1, 7 L.Ed. 327 (1829);

Motion Picture Patents Co. v. Universal Film Mfg. Co., 243 U.S. 502, 510-511, 37 S.Ct. 416, 61 L.Ed. 871 (1917);

Mercoird Corp. v. Mid-Continent Inv. Co., 320 U.S. 661, 665, 64 S.Ct. 268, 88 L.Ed. 376 (1944);

Mazer v. Stein, 347 U.S. 201, 219, 74 S.Ct. 460, 98 L.Ed. 630 (1954);

Sinclair & Carroll Co. v. Interchemical Corp., 325 U.S. 327, 330-331, 65 S.Ct. 1143, 89 L.Ed. 1644 (1945).

A valid patent must add to, not detract from, the state of the prior art. It is a public service to strike down an invalid patent, which is in truth a trespass upon the public domain, as Justice Douglas observed in *Automatic Radio Mfg. Co. v. Hazeltine Research*, 339 U.S. 827, 840, 70 S.Ct. 894, 94 L.Ed. 1312 (1950).

The very power of Congress to grant a patent is limited and delineated by the purpose proclaimed in the constitutional grant itself:

"The Congress shall have Power To promote the Progress of Science and useful Arts, by securing for limited Times to Authors and Inventors the exclusive Right to their respective Writings and Discoveries." *Constitution of the United States*, Article I, Section 8, Clause 8.

The power is one "To promote the Progress of Science and useful Arts"; the "exclusive Right" conferred by the patent is merely the means of accomplishing the intended result. *Automatic Radio Mfg. Co. v. Hazeltine Research*, 339 U.S. 827, 836-837; *Great A. & P. Tea Co. v. Supermarket Equipment Corp.*, 340 U.S. 147, 154-156, 71 S.Ct. 127, 95 L.Ed. 162 (1950); U.S. Const. Art. I, sec. 8, cl. 8.

The Garbell '758 patent teachings were old, not new, in 1945, and the claimed combinations achieved no unexpected result.

Claims 2, 3 and 7 of the '758 patent rely on a method which Ira Abbott, formerly Director of Research for NASA, stated to the Trial Court was old and that "some of the English maintain that this was done to some extent in England even before the turn of the century." "The first attempt to do this, in anything like a useful manner was by Prandtl in the general period around the beginning of World War I." "I think his work covers the period of about six years more or less centered around 1914." [Abbott: R.T. 1360-1361].

The aerodynamic principle, utilized by Garbell in the claims of his '758 patent alleged to be infringed, is that increasing the camber of a given airfoil section, in general, raises the maximum lifting capability of the wing in which that section is placed. Dr. Munk,

plaintiffs' own witness, testified that an increase in camber to delay the occurrence of stall in a wing "is the broad rule and generally to be expected with great probability". Further, Dr. Munk testified that he had been aware of this rule "since 1915". [Deposition read by court *Munk*: (Deposition p. 90, line 12 thru 92, line 13). R.T. 2132 and [*Munk* Deposition: Exhibit IE, p. 92, R.T. 2110, 2185].

The National Advisory Committee for Aeronautics ("NACA") was created by the Congress in 1915 "for the supervision and direction of the scientific study of the problems of flight". 15 U.S.C. §151.

In 1929 the NACA undertook systematic study of airfoil sections so that wing designers would have available to them data on airfoil sections for use in the aircraft wings. The initial results of this work were published in 1933 by the NACA in Report No. 460 entitled "The Characteristics of 78 Related Airfoil Sections from Tests in the Variable Density Wind Tunnel", *Exhibit A*, co-authored by Robert M. Pinkerton, one of the witnesses for the defendants in this action [Ex. A, R.T. 967].

It is to be noted that copies of NACA reports, such as No. 460, Ex. A [R.T. 967], were priced at 15 cents.

Concurrently, the NACA was studying the performance of wings which incorporated the airfoil sections it had developed and analyzed. Report No. 572, *Exhibit E* [R.T. 1331] is entitled "Determination of the Characteristics of Tapered Wings" from which "the characteristics of a wing of any form may be calculated when the section characteristics are known from experiment" and includes "a method for estimating the lift

coefficient at which a tapered wing begins to stall". [Exhibit E, p. 1 R.T. 1331] Report No. 703, *Exhibit I* [R.T. 988] is entitled "Design Charts Relating to the Stalling of Tapered Wings", and Technical Note No. 713 presented "A Comparison of Several Tapered Wings Designed to Avoid Tip Stalling". Report No. 627, entitled "Experimental and Calculated Characteristics of 22 Tapered Wings", *Exhibit G* [R.T. 1079] at page 14, suggests that in a wing designed to avoid tip stalling, airfoil "sections having increasing c_l max. (increased camber) toward the tips" be used.

When Professor Pinkerton, who was with NACA when these reports were prepared, was asked to compare the prior art with the patent in suit, he simply stated "I can't read anything in the patent beyond what we knew and practiced in the '30's." [R.T. 1021.]

Ira Abbott, who co-authored NACA Report No. 824, *Ex. K*, R.T. 1342, 1343 entitled "Summary of Airfoil Data" which was later published in book form under the name "Theory of Airfoil Sections", *Ex. 36-1* [R.T. 1519] testified:

"If there is anything new in the patent, I have been unable to find it." [R.T. 1427.]

At trial Garbell finally conceded that the novelty he had theretofore claimed was in fact old in the art.

He conceded it was old in the art:

- (1) to use three or more controlled sections to define the exterior shape of an aircraft wing;
- (2) to select such sections for aerodynamic purposes including avoiding tip stall—an object of the patent;

- (3) to increase the lift of a section to avoid tip stall by increasing the camber of the section;
- (4) to have the least cambered section at the root,
- (5) the greatest cambered section at the tip; and
- (6) an interjacent section that was at variance with the section obtainable by straight line fairing between root and tip. [R.T. 120-121, 204-205, 167, 791, 792, 796, 890, *Ex. G, I*, R.T. 1079-988].

This Court has admonished:

"Courts should scrutinize combination patent claims with a care proportioned to the difficulty and improbability of finding invention in an assembly of old elements. The function of a patent is to add to the sum of useful knowledge. Patents cannot be sustained when, on the contrary, their effect is to subtract from former resources freely available to skilled artisans. A patent for a combination which only unites old elements with no change in their respective functions, such as is presented here, obviously withdraws what already is known into the field of its monopoly and diminishes the resources available to skillful men." *Great Atlantic & Pacific Tea Co. v. Supermarket Equip. Corp.*, 340 U.S. 147, 152-153, 71 S.Ct. 127, 95 L.Ed. 162 (1950). See also *Lincoln Engineering Co. of Illinois v. Stewart-Warner Corp.*, 303 U.S. 545, 58 S.Ct. 662, 82 L.Ed. 1008 (1938).

The Garbell '758 patent claims a grouping of old elements (airfoil sections), functioning in the same manner (in a wing), which produce no new or syner-

gistic result. As demonstrated herein at pages 10-14, the prior art Pinguino sailplane wing achieved the same result; *i.e.* the result which Garbell likes to call the "Garbell Stall".

In *Great Atlantic & Pacific Tea Co. v. Supermarket Equipment Corp.*, 340 U.S. 147, 151, 152, 71 S.Ct. 127, 95 L.Ed. 162, this Court said that the concept of invention is inherently elusive when applied to a combination of old elements. This Court pointed out that the conjunction of known elements must contribute something, and that only when the whole in some way exceeds the sum of its parts is the accumulation of old devices patentable. In *A. & P.* this Court also noted that it is more likely that a valid combination could be found in chemistry or electronics than in mechanics. This Court said:

"Elements may, of course, especially in chemistry or electronics, take on some new quality or function from being brought into concert, but this is not a usual result of uniting elements old in mechanics." *Great Atlantic & Pacific Tea Co. v. Supermarket Equipment Corp.*, 340 U.S. at 152, 71 S.Ct. at 130.

In affirming the trial court in these actions, the Ninth Circuit Court of Appeals stated:

"The court also found that the essence of the Garbell Wing had been published and was well known more than one year prior to his patent application. This knowledge was imparted through reports and publications by Garbell himself as well as by other aeronautical engineers and the National Committee on Aeronautics." *Maurice A. Garbell v. Boeing Co.*, 546 F.2d 297, 299 (9th Cir. 1976).

The trial court's findings are fully supported by the evidence. In addition to the evidence presented by the Garbell plaintiffs, without limitation, in Exhibits 695-1 through 695-71A [C.T. 2703, 2764] as summarized herein on p. 50, the subject matter of Garbell's patent was more completely disclosed in the following publications than in the patent: (1) Zien article published in *Luftfahrtforschung*, Germany 1938 [Exs. AP, AP-1; R.T. 442, 490]; (2) Dr. Albert E. Lombard, Jr.'s disclosure (1936), *Journal of the Aeronautical Sciences* [Exs. BC; R.T. 984]; (3) Lachmann's disclosure (1937) *Journal of the Royal Aeronautical Society* [Exs. AO, AO-1; R.T. 437]; and the NACA publications. The object of Garbell's alleged invention and Garbell's approach to wing design was old in 1945. Every witness, including Garbell, testified that the subject matter of the Garbell patent was old. Not one witness was produced by the Garbell plaintiffs to testify that there was any novelty at all in the patent in suit. In summary:

*Dr. Lombard stated that the methodology set forth in the patent in suit was, "Widely known" by 1944; and further, "My opinion, sir, is that it should have been known. That methodology was published in the three most reputable professional journals . . .". [Lombard: R.T. 1733.]

*Dr. Lombard testified that Zien's disclosure for providing high lift and low drag is a more complete disclosure than the description of the alleged invention set forth in the specification of the '758 patent. [R.T. 1688-1690.]

*"I can't read anything in the patent beyond what we knew and practiced in the 30s". [Pinker-ton: R.T. 1021.]

*Mr. Ira Abbott testified, "If there is anything new in the patent, I have been unable to find it". [*Abbott*: R.T. 1427.]

*In an Italian article published in 1938, Mr. G. Preti, a sixteen year old colleague of Garbell, wrote of the advantages of combining more than two airfoil sections in a wing. In Exhibit AI, Mr. Preti states: "All airplane designers know the advantages which are obtained by the use of wings, the profile of which is not constant, but varies from root to tip." [Exhibit AI, R.T. 535, 539].

The only live witness, other than Dr. Garbell, produced by plaintiffs at trial was Dr. William Bailey Oswald, formerly chief aerodynamicist at Douglas when the DC-8 airplane was designed. Dr. Oswald testified that he had never even read the Garbell patent in suit [R.T. 2897-2898]. When he was shown the patent drawings at trial, Dr. Oswald testified that the patent drawing (Fig. 2) demonstrated a dangerous stall characteristic [R.T. 2906].

To the extent that the validity of the claims of the patent in suit depends on a combination of elements that produce in some way or manner a surprising or unusual result which would not have been expected by a person having ordinary skill in the art, the patent in suit does not meet this test.

Great Atlantic and Pacific Tea Co. v. Supermarket Equipment Corp., 340 U.S. 147, 71 S.Ct. 127, 95 L.Ed. 162 (1950);

Anderson's Black Rock, Inc. v. Pavement Salvage Co., Inc., 396 U.S. 57, 90 S.Ct. 305, 24 L.Ed.2d (1969);

Spring Crest Company v. American Beauti Pleat, Inc., 420 F.2d 950 (9th Cir. 1970);

Hamlow v. Scientific Glass Apparatus Corp., 421 F.2d 173 (9th Cir. 1970).

Wings covered by the patent claims do not produce uniform results. The Curtiss prior art aircraft achieved the objects of the patent (see prior section on Curtiss, pp. 28-31 herein), the Convair 240 [CVAC Tr. 372, 373; RM 1-2; R.T. 833, 834] had root stall and the Convair 880 had tip stall [R.T. 1651-9].

The '758 patent drawings themselves demonstrate a dangerous stall [*Oswald* R.T. 2906]. As Mr. Dunn of McDonnell Douglas observed with respect to Fig. 2 "In the vernacular that is a lousy wing." [R.T. 3619-20].

Dr. Lombard testified that the prior art, however, had solved the stall problem by 1940.

"Lachmann visited Cal Tech during the period of approximately 1937 to 1940 at a time when I was in residence at Cal Tech and we had an opportunity to discuss our researches not only in dealing with the subject of camber but in dealing with the broader subject of lift and stall characteristics.

"The details of that discussion escapes my memory, but I have a strong recollection that we had substantial agreement and harmony between the two of us that 'A' this was the problem and that there was a variety of solutions to this problem." [R.T. 1718, 1719].

Where the prior art wings achieve the results sought by the inventor with an assemblage of old elements

and later designs covered by the claims do not, the court correctly found the patented combinations achieve no new result, Findings H1-H17, and lack utility.

In *Graver Tank & Mfg. Co. v. Linde Air Products*, 336 U.S. 271, 276-277 (1949), the Supreme Court stated that claims which are drawn so broadly as to read upon significant numbers of inoperative embodiments are invalid.

"Utility *vel non* presents a question of fact. As well said by Judge Learned Hand, 'A judge is entirely unadapted to decide such a question as an original question and must rely upon the testimony of skilled artisans or of experts in mechanics.' *Manhattan Book Casing Mach. Co. v. E. C. Fuller Co.*, S.D.N.Y. 1912, 274 F. 964, 967."

Lorenz v. General Steel Products Company, 337 F.2d 726, 727 (5th Cir. 1964).

The term "useful" as used in the patent law means that the invention must attain the result claimed by the inventor in his disclosure; in other words, it must work and accomplish the purposes set forth in the specifications. *O'Reilly v. Morse*, 56 U.S. (15 How.) 62, 119, 14 L.Ed. 601 (1853); *Coupe v. Royer*, 115 U.S. 565, 572-574, 579, 15 S.Ct. 199, 39 L.Ed. 263 (1895); *H. Brinton Co. v. Mishcon*, 93 F.2d 445, 448 (2d Cir. 1937); *Moffett v. Fiske*, 51 F.2d 868, 871-872 (D.C. Cir. 1931); *Besser v. Merrilat Culvert Core Co.*, 243 F. 611, 612 (8th Cir. 1917).

In *O'Reilly v. Morse*, *supra*, 56 U.S. at 119, the Supreme Court spoke directly to the point in issue:

"Whoever discovers that a certain useful result will be produced, in any art, machine, manufacture, or composition of matter, by the use of certain means, is entitled to a patent for it; provided he specifies the means he uses in a manner so full and exact, that any one skilled in the science to which it appertains, can, by using the means he specifies, without any addition to, or subtraction from them, produce precisely the result he describes. And if this cannot be done by the means he describes, the patent is void."

The Garbell Patent in Suit Was Anticipated by Prior Art and Thus Was Invalid Under 35 U.S.C. §102(a). Garbell's Alleged Invention Had Been on Sale and in Public Use and Described in Printed Publications More Than One Year Prior to the Date Garbell Filed His Patent Application. Thus, the Garbell Patent Was Invalid Under 35 U.S.C. §102(b).

The Garbell patent in suit was anticipated by the prior art Curtiss-Wright Model 21B and Model 23 airplane wings [FF1-FF23; 385 F.Supp. 1, 18-21].

The geometry findings of the Special Master on the Curtiss-Wright Model 23 and Model 21-B prior art wings are set forth and discussed in some 20 pages of the Original Report of the Special Master [Court Exhibit 1; C.T. 2308-2327]. The Curtiss-Wright Models 23 and 21-B have identical wing geometry [C.T. 2309]. From the Special Master's geometry findings on these Curtiss-Wright prior art wings, and from the additional evidence presented at the trial before the District Court, the Trial Court found the '758 patent to be invalid and anticipated by the Curtiss-

Wright Models 23 and 21-B prior art wings [Findings of Fact F1 through F22 at 385 F.Supp. 1, 18 to 21].

The Model 21-B was built and sold in this country in 1940 [R.T. 848-849; 1253; 1258], saw service with the Dutch East Indies Air Force against the Japanese.

Prof. Pinkerton testified, that the wings had all the elements of claims 2, 3 and 7 of the '758 patent [Court Exhibit 1; Exhibit BC; Exhibit F (NACA Report Tr. 586); Exhibits 10, 10-1, IP, IP-1; R.T. 976-987]. The plaintiffs presented no evidence to the contrary.

As set forth herein, pp. 28-32, 50-51, plaintiffs added to the proof that the Curtiss-Wright Model 21B and Model 23 aircraft wings anticipate the Garbell patent in suit. Plaintiffs knew for certain that the patent was anticipated, but still pressed on to trial.

Additional evidence on the aerodynamic characteristics of the CW-21B and CW-23 airplane wings was presented by defendants.

As to the stall characteristics experienced during flight, tests of the Model 23 airplane, Mr. Butterworth testified:

"The stall characteristics were, say, typical and *expected*. There was a pronounced pitch-down of the nose at the stall. There was noticeable buffeting and there would be some roll, sometimes to the left, sometimes to the right. But in each case it was controllable by the pilot without any particular difficulty." [R.T. 1241-1245].

The word "expected" in Butterworth's testimony emphasizes the fact that Butterworth was looking for

good stalling characteristics and he appreciated the fact that the CW-23 airplane demonstrated those qualities in good stall warning and good control of the airplane by the pilot.

The good stalling characteristics of the CW-23 were additionally demonstrated in the Curtiss-Wright Model 21-B. William Nickey, Curtiss test pilot, flew the 21-B and verified that fact [R.T. 1910, 1987].

Beyond any doubt at all, the Curtiss-Wright Model 21B and Model 23 aircraft wings anticipate the claims of the Garbell patent in suit and the aerodynamic stall characteristics of those prior art wings were expected, achieved and recognized by all. There is no evidence to the contrary.

In addition to the Curtiss-Wright anticipation, the trial court found that the "Garbell Wing" was on sale more than one year prior to the date of the patent application and that Garbell actively participated in those sales efforts. *Maurice A. Garbell, Inc. v. Boeing Company*, 385 F.Supp. 1, 8-9, 28-29. As set forth herein, pp. 19-25, the XB-46 airplane wing was on sale and sold prior to the critical date, i.e. July 16, 1945. Contrary to Garbell's testimony in the CVAC action in 1950, Garbell knew that the XB-46 airplane had a 3-section wing which he patented more than one year after it was sold. The sale of the XB-46 data and wind tunnel wing must have been considered by Garbell to be important to the validity of his patent when he testified before Judge Yankwich in the 1950 CVAC action as follows:

"Q. They never told you they were going to use your 3-section wing on that XB-46?

"A. (Dr. Garbell) No." [CVAC R. Tr. 459, Exs. RM-1, RM-2, R.T. 833, 834].

In addition to the sale of the XB-46 airplane wing, Garbell was directly involved in selling "Garbell Wings" in May of 1944, more than two years before he patented those wings. (See pp. 22-24 herein). Contrary to Garbell's testimony before Judge Yankwich in 1950, Garbell's 3-section "tailless" wing was on sale, disclosed to the NACA, a public body, and used by the NACA in 1943-1944. His sales activities must have been deemed by Garbell to affect the validity of his patent when he testified in 1950 before Judge Yankwich that he did not try to sell a tailless airplane to the Navy which incorporated a 3-section wing, and when he testified that the NACA at Langley Field tested only a 2-section wing (See pp. 22-24 herein).

In *Piet v. United States*, 176 F.Supp. 576 (D.C. Cal. 1959), 283 F.2d 693 (9th Cir. 1960), District Court Judge Yankwich, the trier of fact in the earlier CVAC action, found a classified secret sale to be "on sale".

The Ninth Circuit in the case of *Robbins Company v. Lawrence Manufacturing Company*, 482 F.2d 426 (9th Cir. 1973) analyzed the on-sale doctrine:

"A sale or offering for sale precludes any inquiry into the experimental nature of the sale *unless the contract of sale or the offering for sale contains an express or clearly implied condition that the sale or offering is made primarily for experimental use.*"

There is no evidence of a contractual agreement to limit the sale or offering of the CVAC XB-46 wind tunnel wing to Garbell's experimental use. Nor is there the slightest evidence to show that the Government agreed to "experiment" for the benefit of Dr. Garbell.

To the contrary, the contract executed in January 1945 states:

"The contractor hereby grants to the Government the right to reproduce, use and disclose for all governmental purposes any and all reports, drawings, blueprints and data to be delivered by the contractor to the Government under the terms of that contract." [*Exhibit GT; GT-1, R.T. 766, 939*].

No seller-imposed conditions of secrecy are found in the CVAC/Government agreements. Under the rule expressed by this Court in *Robbins*, the absence of any seller-imposed restriction should preclude further inquiry on the subject of "experimental use".

Airplane wings are not shelf items. In fact, plaintiffs themselves averred:

"Sales contracts for aircraft do not await the manufacture of wing models. They are not 'off the shelf' articles". [Plaintiffs' "Motion for Summary Judgment etc.", (C.T. 1089).]

Contrary to the suggestion by the Garbell patentees (Pet. pp. 4, 5, 8, 9, 13, 14), recent authorities are consistent with the public use and on sale holding by this Court in *Egbert v. Lippmann*, 104 U.S. 333, 26 L.Ed. 755; *Elizabeth v. Pavement*, 97 U.S. 126 (1877). See *Robbins Company v. Lawrence Manufacturing Company*, 482 F.2d 426 (9th Cir. 1973); *Dart Industries, Inc. v. E. I. DuPont de Nemours and Co.*, 489 F.2d 1359 (7th Cir. 1973).

As stated by Judge Stevens:

"The record before us discloses completed sales before the critical date as well as other selling activity. In our opinion, the patented product need

not be on hand in commercial quantities for it to be 'on sale' within the meaning of §102(b)."

Dart Industries, Inc. v. E. I. DuPont de Nemours and Co., 489 F.2d 1359, 1365.

Contrary to the Garbell Petitioners' statement (Pet., p. 16), the "Garbell Wing" was described in a printed publication. Dr. Garbell knew that the Pinguino sailplane, which demonstrated convincingly that each of the objects of his "Garbell Wing" invention (later patented) had been fully achieved, had been fully described in printed publications in Europe during the late '30s. See pages 5-16 herein. In addition, Garbell's "official disclosure of invention" to CVAC, was sent to the Institute of Aeronautical Sciences ("IAS") for publication. He testified [R.T. 778-781] that a great many college professors and aerodynamic engineers working in the airframe industry read it before July 15, 1945 [FF I18-I25, 385 F.Supp. 1, 29-30; *Preliminary Findings*, 385 F.Supp. 1, 8-9]. Garbell was told by the IAS that they intended to distribute copies of the "official disclosure of invention" to company libraries and government departments where they would be available for reference [FF I22, 385 F.Supp. 1, 29-30]. As heretofore pointed out (p. 25 herein) the "Poor-Man's Garbell Wing" covered by Claim 11 of the patent in suit, was described in a printed publication [Ex. KF; R.T. 1384, 1396], was released and available to government contractors in March 1945 [FF I16-I17, 385 F.Supp. 1, 29].

Garbell's argument (Pet., p. 16) is not well taken. The "Garbell Wing", the "Poor-Man's Garbell Wing" and the "Official Garbell Wing" were described in printed publications more than one year prior to his patent application.

Hamilton Laboratories v. Massengill, 111 F.2d 584 (6th Cir. 1940); *Application of Tenney*, 254 F.2d 619, 45 C.C.P.A. 894 (1958); *Garrett Corporation v. United States*, 422 F.2d 874, 878, 190 Ct.Cl. 858 (1970); *Philips Electronic & Pharmaceutical Industries Corp. v. Thermal and Electronics Industries, Inc.*, 450 F.2d 1164 (3rd Cir. 1971); *Popeil Brothers, Inc. v. Schick Electric, Inc.*, 494 F.2d 162 (7th Cir. 1974).

The Garbell Patent in Suit Is Invalid Under 35 U.S.C. §103. The Courts Below Properly Applied the Law Laid Down by the Supreme Court.

In holding the Garbell patent in suit invalid under 35 U.S.C. §103, the courts below properly applied the law laid down by the Supreme Court.

On the issue of obviousness, the Trial Court concluded as follows:

"18. The subject matter of the patent in suit, taken as a whole, would have been obvious to persons of ordinary skill in the art prior to the time of the alleged invention, 35 U.S.C. §103, *Graham v. John Deere Co. of Kansas City*, 383 U.S. 1, 86 S.Ct. 684, 15 L.Ed. 2d 545 (1965); *Walker v. General Motors Corporation*, 362 Fed. 2d 56 (9th Cir. 1966)."

Speaking for the Ninth Circuit in the *Walker* case, *supra*, Judge Browning recited the elements of the obviousness test set out by the Supreme Court in *Graham, supra*:

"As the Supreme Court has recently pointed out, the basic factual background necessary to a determination of section 103 obviousness relates to three matters: (1) 'the scope and content of the

prior art'; (2) 'differences between the prior art and the claims at issue'; and (3) 'the level of ordinary skill in the pertinent art.' *Graham v. John Deere Co.*, 383 U.S. 1, 86 S.Ct. 684 (1966). [Walker case at 362 F.2d 59.]

The level of ordinary skill in the pertinent art was observed by the Trial Court in Finding G34 to the effect that: "The level of skill in the airframe industry is extraordinary. . . ." Moreover, the court found no critical difference between the example wing disclosed by Zien and a wing covered by Claims 1, 2, 3 and 7 of the patent in suit (G7) and that "there is no critical difference between the geometry of the example wing given by Lachmann and the geometry of wings covered by Claims 1, 2, 3 and 7 of the patent in suit." (G10.) In summary, the conclusion of obviousness of the subject matter of the patent is amply supported in every particularly of the *Graham* test.

The Usual Presumption of Patent Validity Under 35 U.S.C. §282 Is Vitiating in This Case by Reason of the Fact That Garbell Did Not Cite to the Patent Office, and the Patent Office Did Not Consider, the Most Pertinent Prior Art.

The usual presumption of patent validity under 35 U.S.C. §282 is vitiating in this case by reason of the fact that Garbell did not cite to the Patent Office, and the Patent Office did not consider, the most pertinent prior art.

As set forth herein, the most pertinent prior art Pinguini sailplane wing, publicly demonstrated and described in printed publications in the late '30s (by Garbell himself) was not cited to the Patent Office. (See pp. 4-17, 39-40 herein). Garbell deliberately mis-

led Judge Yankwich on the Pinguino and its pertinence (see pp. 14-17 herein).

It was testified to (and not contradicted by Garbell) that while Cronstedt was more pertinent than the other patents cited in the prosecution of the '758 patent in the Patent Office, "these four patents that were cited, are less pertinent than other material such as Lachmann, Tsien, NACA Reports" and the Zacher article written on the D-30 Cirrus sailplane. [Abbott: R.T. 1485-1487.]

The usual presumption of patent validity (35 U.S.C. §282) is vitiating in this case by reason of the fact that the applicant did not cite to the Patent Office, and the Patent Office did not consider, the most pertinent prior art, including the printed publications describing the prior art Pinguino sailplane wing, the Curtiss-Wright Models 23 and 21B airplanes, the Zien article, the Lachmann article, the Lombard article, the Zacher article, and N.A.C.A. Report Nos. 572, 703 and 713, all of which prior art aircraft and references are more pertinent than the references cited by the Patent Office. *Pressteel Co. v. Halo Lighting Products, Inc.*, 314 F.2d 695 (9th Cir. 1963); *Monroe Auto Equipment Company v. Superior Industries, Inc.*, 332 F.2d 473 (9th Cir. 1964); *Henderson v. A. C. Spark Plug Division of General Motors Corp.*, 366 F.2d 389 (9th Cir. 1966); *Groen v. General Foods Corporation*, 402 F.2d 708 (9th Cir. 1968). The patentee is charged with full consequences of all prior knowledge or use by others. *Everlube Corporation of America v. Electrofilm, Inc.*, 154 F.Supp. 788, 803 (D.C.Cal. 1957), opinion adopted on appeal, 265 F.2d 495 (9th Cir. 1959); *Condenser Corporation of America v. Micamold Radio Corp.*, 145 F.2d 878 (2nd

Cir. 1944); *Bone v. Marion County*, 251 U.S. 134, 40 S.Ct. 96, 64 L.Ed. 188 (1919).

Conclusion.

Demonstrably, the facts themselves met, and meet, the questions raised by plaintiffs' petition for a writ of certiorari. The facts set out above, the findings and conclusions, all meet the points raised. Garbell's bad-faith conduct by any standard was willful. The invalidity facts are clear, unequivocal and convincing: the defendants' proof, offered through uncontroverted documents and the testimony of those whose extraordinary skill is found throughout the airframe industry, was not controverted; instead it was augmented by evidence the plaintiffs themselves presented. The trial court's findings, conclusions and judgment could not have been different. After reviewing the extensive trial record, the Ninth Circuit affirmed "in all respects." Defendants thus submit that this case presents no reasons for granting certiorari and earnestly request that these cases be concluded—that the petition be denied.

Respectfully submitted,

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MICHAEL R. ... CLERK

In the Supreme Court

OF THE
United States

OCTOBER TERM, 1976

No. 76-1425

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and
GARBELL RESEARCH FOUNDATION

Petitioners,

v.

THE BOEING COMPANY,

Respondent.

AND

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v.

McDONNELL-DOUGLAS CORPORATION,

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PETITION FOR WRIT OF CERTIORARI
to the United States Court of Appeals
for the Ninth Circuit

PETITIONERS' REPLY BRIEF

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May 18, 1977

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CASE CITATIONS

<u>Maurice A. Garbell, Inc., etc. v. Consolidated- Vultee Aircraft Corporation, etc.</u> 94 F.Supp. 843 (S.D. Cal. 1950) 204 F.2d 946 (9th Cir. 1953)	2
<u>Maurice A. Garbell, Inc., etc. v. Boeing Company, etc.</u> 385 F.Supp. 1 (C.D. Cal. 1973) 546 F.2d 297 (9th Cir. 1976)	2
<u>United States of America v. Manufacturers Aircraft Association, etc.</u> Stipulated Final Judgment, S.D. NY 72 Civ. 1307, November 11, 1975; cit. CCH 1976-1 Trade Cases, Case 60,810, p. 68,503.	4

Introduction

Respondents' Brief in Opposition outrageously distorts both the facts and the law. It attempts to rationalize the rejection of the statutory presumption of patent validity and the imposition of in-terrorem attorneys' fees against patent holders by a skein of confusion and a tissue of misrepresentation.

I. Respondents Have Misrepresented the Record With Respect to the Pinguino Sailplane.

Respondents' principal thesis for the invalidity of the Garbell wing patent in suit and for a holding of Petitioners' bad faith in prosecuting the lawsuit is that Dr. Garbell did not disclose prior publications of his own work with experimental sailplanes in Italy in 1937-38. The very idea that an inventor is to be held in bad faith because he did not disclose his own prior inventive work is preposterous. Moreover, both in the 1950 suit and in the instant suit the experimental sailplanes were held not to be prior reductions to practice of the invention claimed in the patent in suit. The charge that Dr. Garbell did not disclose his prior work and its publication to the Patent Office is utterly false. Respondents' new claim that a 16-year-old high-school student and assistant of Dr. Garbell's was the co-inventor of Dr. Garbell's invention is without any support in the record and was never even asserted below.

The record shows unequivocally that Dr. Garbell applied for the Garbell wing patent in suit, U.S. Patent No. 2,441,758, on July 16, 1946 (Exh. AU) and was required by the Patent Office Examiner to divide from the parent application certain claims relating to high-camber wing shapes more suitable for relatively low-speed airplane wings (Exh. AU-1). Dr. Garbell complied, and on September 16, 1946, filed a "divisional" application with the divided claims (Exhs. AV and AV-1). That "divisional" patent, U.S. Patent No. 2,498,262, is not in suit here.

Dr. Garbell's prior work and the publication concerning the Italian sailplane flights and other activities predating the patent application were disclosed to the Patent Office Examiner by Dr. Garbell in 1947, during the pendency of the application (R.T. 3459:15 through 3463:10).

The fact that Respondents would base their principal argument to this Court on so obvious a falsehood, in an attempt to confuse this Court into condoning a judgment based upon such a falsehood, demonstrates the need for this Court to intervene.

The other arguments in Respondents' Opposition are mere makeweight. None of them could possibly justify a finding of bad faith in the assertion of the validity of the Garbell wing patent in suit.

Respondents' argument on pages 1 through 19 of Respondents' Brief is an attack on the integrity of Dr. Garbell's conduct before the Patent Office and before District Court Judge Yankwich in the previous "CVAC" action (Maurice A. Garbell, Inc., etc. v. Consolidated-Vultee Aircraft Corporation, etc. (94 F.Supp. 843; S.D.Cal. 1950. 204 F.2d 946; 9th Cir. 1953).

First, the Court in these cases (Maurice A. Garbell, Inc., etc. v. Boeing Company, etc. 385 F.Supp.1; D.C. Cal. 1973. 546 F.2d 297; 9th Cir. 1976) stated in announcing his decision from the bench on June 2, 1972:

"I do not find fraud here, the kind of fraud that is required for fraud upon the patent office which will invalidate the patent." (R.T. 204:2-4. Emphasis added)

Second, the Court in these cases found:

"E1. Neither the patentee, Dr. Garbell, nor the plaintiffs ever actually reduced to practice the alleged invention covered by Claims 1, 2, 3 and 7 of the patent in suit." (Appendix A-31)

Third, the only evidence on the conduct of Dr. Garbell before the Patent Office is Dr. Garbell's own un rebutted testimony, that at an interview with the Examiner in the Patent Office, as evidenced in the file wrapper (Exh. AU-1), Dr. Garbell disclosed to the Examiner and discussed with the Examiner the published article on his Pinguino and other activities preceding his application which matured into the patent in suit (R.T. 3459:15 through 3463:10). The Examiner held the claims in suit patentable over those disclosures.

Fourth, all of the articles describing the Pinguino and related flight activities in Italy were examined exhaustively at the previous trial before Judge Yankwich in the 1950 trial. Judge Yankwich held the claims in suit patentable over such asserted prior art and publication.

II. Respondents' Reliance on the Curtiss-Wright Evidence Is Untenable.

The Curtiss-Wright evidence was rejected by the Court in the 1950 suit, and Respondents' argument on pages 28 through 34 of their Brief implicitly concedes the correctness of the ruling of the Special Master in these cases:

"It is true that the evidence is less than one would desire to determine definitively and free from doubt what shape the CW-23 airfoil probably took." (Cl.R. 2324:11; Emphasis added).

Respondents now rely mainly on a transmittal memorandum by a patent attorney who was not with Curtiss-Wright at the time of the events pertaining to the CW-21B and -23 models and who, therefore, could not and did not testify in either case to any of those events. That patent attorney merely transmitted to his superior six pages of a 109-page intramural proposal report (Exh. IH-10A) without any explanation as to the contents of the missing 103 pages or the outcome of the

proposal. That patent attorney wrote: "We know of no Curtiss-Wright airplane, except the prior art airplane referred to below which could be construed as coming within the scope of his (Garbell's) patent."

That self-serving hearsay opinion by a patent attorney cannot be used to overcome the statutory presumption of patent validity or to justify the findings that the patent owners were in bad faith.

The attempt to elevate its insignificance on the ground that plaintiffs offered it in evidence, is another distortion of the record. The memorandum was offered by Petitioners as part of an extensive sheaf of correspondence (Exh. 695-1 through 695-71, among others) between the members of the Manufacturers Aircraft Association (subsequently dissolved under a Sherman-Act Judgment in United States of America v. Manufacturers Aircraft Association, S.D.NY 72 Civ. 1307, November 11, 1975; CCH 1976-1 Trade Cases, Case 60,810, p. 68,503) for the limited purposes to provide proof of the unobviousness of the patent in suit and of the collaboration between all airframe manufacturers, including the Respondents, in the prior suit (R.T. 2763-2764).

Respondents' claim that the attorney's transmittal memorandum was "corroborated" by numerous engineers is false. The only design engineer who could have corroborated the alleged design of the Curtiss-Wright CW-21B and -23 wings, is Charles Hurkamp. None of the other persons named in Respondents' Brief were design engineers. Mr. Hurkamp, who was the "design engineer" who designed the CW-23 airfoil section for the CW-21B and -23 wing shape, could not remember even seeing the proposal report identified by said six extracted pages (Exh. IH-10A) during his employment at Curtiss-Wright (Hurkamp Deposition Transcript, Special Master Exhibit 300, p. 98, lines 19-20). Mr. Hurkamp did not recollect what was done (Hurkamp Dep.Tr., supra, pp. 28 through 34) and he was not "sure" what kind of airfoil CW-23 was (Hurkamp Dep.Tr., supra, 105:5-10).

III. Further Examples of Respondents' Distortions of the Record.

1. The illustrations opposite page 10 of Respondents' Brief.

Respondents refer to "the prior art Pinguino Wing" as identical with the wing in the Garbell patent in suit. The reference to "the Pinguino Wing" is misleading. The two wing depictions on the page opposite page 10 of Respondents' Brief are identical, because U. S. Patent No. 2,498,262, a divisional application, was divided from the application for U. S. Patent No. 2,441,758 on requirement by the Patent Office Examiner, whereupon the same illustrative drawings were used in both Garbell patents. The same explanation also applies to Figure 3 of both Garbell patents, appearing opposite page 12 of Respondents' Brief.

Patent No. 2,498,262 was not in suit in the CVAC case before Judge Yankwich and is not in suit in the instant cases, and Respondents' argument intermingling it with the patent in suit is employed solely to confuse the issues.

2. There Was No Airplane With an XB-46 Wing Prior to the Filing of the Garbell Patent Application.

Respondents desperately try to make it appear as though there had been an airplane with an XB-46 wing in existence prior to the filing of the application for the patent in suit.

The evidence is that neither a wing nor an airplane of the XB-46 type existed at the time of the execution of the contract for a possible future XB-46 development. Therefore, Respondents' argument on pages 20 through 24 of Respondents' Brief is incorrect.

No "full-scale" aircraft or wing of the XB-46 existed during the employment of Dr. Garbell by Consolidated-Vultee Aircraft Corporation, that is, prior to October 1945; there was only a 3/40th-scale miniature static wind-tunnel model intended and used and usable solely for experimental small-scale static wind-tunnel tests attached to wind-tunnel force-balance scales. (S.M. R.T. 2133:11; R.T. 732:7-13).

Respondents' reference to Exhibit BO in Respondents' Brief, page 21, is also misleading, because that document merely suggested (not "required") a discretionary exchange of information subject to the concurrence and acceptance of the suggestion by each airframe manufacturer. There is no evidence whatsoever of any such acceptance or any such exchange of information in the record of these cases.

Respondents argue but cannot point to any evidence at all that would contradict Dr. Garbell's un rebutted testimony that the XB-46 "mock-up" had a two-section wing and not a Garbell wing and that the Garbell wing was not incorporated in any aircraft until long after October 1945, well within the statutory year. There is nothing in Exhibit BO that could impeach a single word of Dr. Garbell's testimony before Judge Yankwich or in these cases; hence, the insinuations throughout Respondents' Brief are unfounded, unjustifiable, scurrilous, and desperate false accusations.

3. Respondents Distort the Evidence as to a "Tailless Plane"

Respondents' Brief, on pages 22 through 27, is not supported by even a shred of evidence in the record. Their argument is an unfounded distortion of the truth.

The uncontroverted evidence is that there never was an actual "tailless" CVAC airplane or even an operating wing for a CVAC tailless; hence, there could not have been a tailless airplane "on sale" at the time of Dr. Garbell's visit with Navy Captain Diehl (R.T. 783:24).

The tailless configuration discussed between Dr. Garbell and Captain Diehl (having a two-section wing and not a Garbell wing) is depicted in Exhibit 28 of the CVAC record (pages 685 through 690 of Exh. RM-III in the present record). Therefore, contrary to Respondents' claim, it was examined by Judge Yankwich and is not a "new claim" by Petitioners as Respondents would have this Honorable Court believe.

The argument on pages 25 and 26 of Respondents' Brief about Mr. Abbott's report on the so-called XB-36 wind-tunnel model experiment with an alternate wing is again unfounded and fallacious. That experiment was made by Mr. Abbott after Dr. Garbell's confidential discussion with him (R.T. 1568:9 through 1570:8), and the Confidential Memorandum Report No. L5B23 was declassified and published not in "February", as Respondents claim, but in October of 1945 (Exh. KF), well within the statutory year (Exh. SD, Neill Deposition Tr. p. 15, line 11, through page 16, line 16, and R.T. 1608:13 through 1610:7).

Therefore, Respondents' contention on pages 26 and 27 of the Respondents' Brief, that plaintiffs came into Court with "unclean hands," cannot be based and is not based on any evidence in the record.

4. Trial Delay.

Contrary to Respondents' representations, Plaintiffs made a motion on October 14, 1966, for immediate trial on all issues (Cl. Tr. 633 through 649) which defendants strenuously opposed, and after denial of plaintiffs' motion, defendants continued to exert their enormous economic resources and power to indulge in their eight-year-long discovery proceedings until plaintiffs' funds were at last exhausted and plaintiffs were then compelled, in early 1971, to request continuance of the trial. This circumstance, created by defendants alone, certainly cannot be characterized justifiably as "misconduct on the part of plaintiffs."

Conclusion

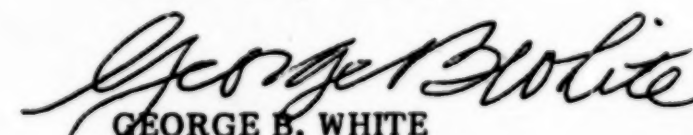
The District Court and the Court of Appeals in these actions disregarded the "clear, unequivocal and convincing evidence" requirements adhered to by all of the authorities cited by Petitioners both with respect to evidence needed to overcome the statutory presumption of validity and with respect to the quality of evidence required for holding a case "exceptional."

It is significant that Respondents' Brief in Opposition stoops to gross distortions of the record and a frantic attempt to defame the inventor, Dr. Garbell, rather than to attempt to support the judgment on the record. The reason is that the judgment cannot be supported on the record. The result reached below is a travesty of the statutory presumption of patent validity, and a cruel misapplication of the requirement for imposing attorneys' fees against a patent owner. Moreover, the unfounded and undeserved defamation by Respondents of Dr. Garbell is hardly a fitting reward for the inventor whose invention makes the flights of innumerable DC-8 airplanes and other air-carrier airplanes so much more safe and secure for their passengers and flight crews.

It is respectfully urged that each error of law committed by the District Court and the Court of Appeals be reviewed to the extent required and sufficient to avoid confusion of rules of law applicable to patent cases, and not summarily.

Petitioners pray that their Petition for Writ of Certiorari be granted.

Respectfully submitted,


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Attorney for Petitioners

May 18, 1977

PROOF OF SERVICE.

I, George B. White, attorney for Maurice A. Garbell, Inc., and the Garbell Research Foundation, Petitioners herein, and a member of the Bar of the Supreme Court of the United States, hereby certify that, on the 19th day of May, 1977, I served four copies of the foregoing Reply Brief on Petition for a Writ of Certiorari to the Supreme Court of the United States on the Respondents herein, by mailing said four copies in a duly addressed envelope, with first-class postage prepaid, to their attorney of record, namely,

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It is certified that all parties required to be served have thus been served.

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